AIR WAR COLLEGE

RESEARCH REPORT

SYSTEMS MANAGEMENT OF AIR FORCE STANDARD COMMUNICATIONS-COMPUTER SYSTEMS--THERE IS A BETTER WAY

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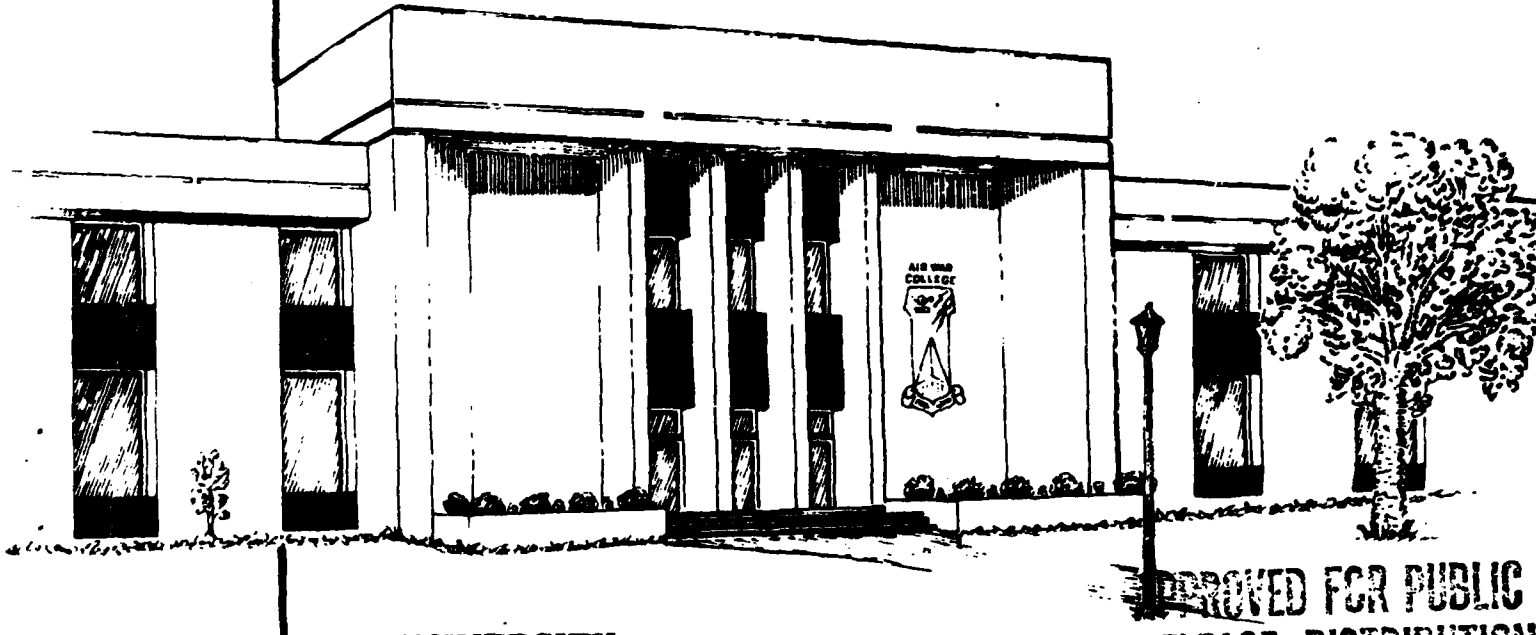
1988



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by

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A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE RESEARCH

REQUIREMENT

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MAXWELL AIR FORCE BASE, ALABAMA

April 1988

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AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Systems Management of Air Force Standard Communications-Computers Systems--There is a Better Way

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~~A discussion of~~ USAF policy and management procedures for acquiring and fielding standard communications computer systems. A review of current Air Force base-level conditions is made to assess the impact of functionals acquiring and fielding unique computer systems through the standard systems contracts and current acquisition process. An analysis of the Air Force acquisition and Life-Cycle Management process is made to assess the viability of existing AF Regulations 700 and 800 toward achieving maximum efficiencies from Life-Cycle practices. A further examination of the Air Force organizational structure is made to determine deficiencies and to make recommendations. The lack of architecture, central authority, and adherence to existing Life-Cycle Management policy causes a fragmented approach to acquiring, controlling, integrating, and providing Life-Cycle Management for communications-computer systems in the Air Force. Conclusions are drawn to assist in overcoming these deficiencies.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Robert A. Allen, Jr. (M.A., Webster College of Saint Louis) has first-hand experience in managing fielded standard communications-computer systems following two assignments as a Communications Squadron Commander, Deputy Group and Vice-Wing Commander, and Assistant Chief of Staff, Air Force Communications Command. He has traveled extensively throughout Southeast Asia and the Philippine Islands while serving in Vietnam and Thailand, as well as Europe's NATO Central Region while recently serving in Germany. He is a graduate of the Air Command and Staff College, Class of 1980, and the Air War College, Class of 1988. He holds the Bronze Star with device, Meritorious Service Medal with four Oak Leaf Clusters, the Commendation Medal, and the Vietnamese Gallantry Cross with Silver Star.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Gary M. Musgrove (M.S., University of Arkansas) has operations and maintenance experience in Communications-Electronic and computer equipment as Chief of Maintenance and Director of Logistics. He has held staff positions in SAC, USAFE, AFLC and NATO's Southern Region. He served as an Inspector for the Air Force Inspection and Safety Center and most recently was assigned to Sacramento Air Logistics Center. He is a graduate of the Air Command and Staff College, Class of 1980, and the Air War College, Class of 1988. His awards are the Meritorious Service Medal with three Oak Leaf Clusters, Joint Service Commendation Medal, and the Air Force Commendation Medal.

BIOGRAPHICAL SKETCH

Mr. Joseph W. (Bill) Davis has extensive experience with the Air Force as an Communications, Electronics and Computer Programmer and Computer Systems Analyst. A graduate of Troy State University with a Bachelor of Science Degree in Computer Science, he entered civil service in 1968 as a Computer Specialist for the Air Force Data Systems Design Center in Suitland, Maryland. In 1971 he moved with the Center to Gunter Air Force Station, Alabama where he held various computer specialist positions associated with the development and acquisition of Air Force and DOD automated systems. In 1977 he became a Configuration Manager for the Phase IV Program Management office and assumed the Division Chief position in 1983. In 1984 he became the Director of Program Control for Task Force IV which managed the worldwide implementation of the AF base level Phase IV computer systems. He became the Director of Configuration Management for Acquisition Systems in the Standard Systems Center at Gunter Air Force State in 1985, remaining in the position until selected to attend the Air War College, Class of 1988.

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CHAPTER I

INTRODUCTION

The United States and the free world are totally dependent upon computers and computer technology. The efficiencies and effectiveness of computers permeates all functions of our lives from environmental control to international banking and defense. Growth of space age technology is driven by the accelerating need and competition within government and the private business community for business and scientific use.

The miniaturization of electronic components and development of super conductive materials for high speed transfer of simple logic data allows for low cost multi purpose systems to move, store, and retrieve information in a variety of ways. The effectiveness of these systems depends upon their design and intended use in relation to other such systems.

The good news is we have successfully integrated the technological upheaval into the defense force to achieve successes heretofore unheard of in national defense systems. The bad news is technology is accelerating so rapidly that hardware and software are now driving the requirements development process. Care must be taken to ensure that systems being fielded conform to an archectiture that is supportable, expandable, and capable of contributing to and

enhancing our warfighting capability. This paper is a thesis focused on the problem of acquiring and fielding standard communications-computer systems to meet Air Force needs in the face of rapidly changing technology and decreasing defense expenditures. The authors reviewed the problem and support the thesis that a lack of archeciture and Life-Cycle provisioning prohibits effective management of these resources, thereby distorting their use at base level.

CHAPTER II

THE PROBLEM

Air Force functional managers are acquiring and fielding communications computer systems unique to their functional area without regard to fully implementing DOD and Air Force Life Cycle Management (LCM) practices. Consequently, Management is unable to account, control, or provide LCM visibility for the communications-computer systems purchased. Additionally, organizations are not designed or equipped for efficient LCM requirement.

Without a carefully developed LCM philosophy the systems management function becomes indecisive and useless to management. Life support options for economic system efficiencies are lost and direct mission degradation results. The increasing demands for integrating standard small computers into basewide networks to share and distribute common data compounds the problem as configuration management of hardware and applications software become critical to the base distribution systems visibility and efficiency.

The Concern

The authors research initially focused on attempting to examine the impact from acquiring large numbers of small and standard computers without sufficient guidance and structure in the field, and to ensure those systems receive

proper Life Cycle Management and line item management. Our thesis is: An impossible managerial situation exists today whereby the proliferation of small and standard computer systems exceeds the Air Force's ability to ensure the equipment purchased is on board, meets the customer needs, and is receiving proper management visibility for Life Cycle needs. Acquisition of standard computer systems through the General Services Agency (GSA) contracts gives the user the ability to spend local operations and maintenance monies to purchase lines of small computer software and hardware from the GSA catalog through base supply at very economical costs. The use of standard system purchasing contracts also allowed functional acquisition of unique systems to support administrative and business functions throughout the Air Force. The Reagan Administration's large influx of money into defense in the early 1980s provided the impetus for spending at both ends of the spectrum on new technolgies for telecommunications and information processing. The pent-up demand for new systems was unleashed and a myriad of contracts were made. Today, the Air Force has fielded over 190,000 small and standard computers in the name of economy of force and greater efficiencies through manpower reductions. Systems were purchased and fielded without full assessment of the base cable distribution system needs or long-term maintenance needs. Standalone mainframes (mini computers) were purchased outside the formal budgeting

process established in AFR 800 and 700 series to expedite procurement and delivery using commercial off-the-shelf hardware with custom-developed applications software. The uniqueness of these functional applications restricts the utility of the systems once installed. Some examples of standard functional systems fielded are as follows:

EXAMPLES OF AIR FORCE STANDARD SYSTEMS

	Functional
Reprographics Automated Manaagement System (RAMS)	SAF/AAD
Records Information Management System (RIMS)	SAF/AAD
Publication Distribution Office System (PDOS)	SAF/AAD
Comptroller Office of the Future (COOF)	SAF/AC
Life Cycle Military Pay System (LCMPS)	SAF/AC
Base Level Accounting and Reporting System (BLARS)	SAF/AC
Retired Annuitant Pay System (RAPS)	SAF/AC
Standard Materiel Accounting System (SMAS)	SAF/AC
Air Force Standard Civilian Automated Pay System (AFSCAPS)	SAF/AC
Central Civilian Pay System (CCPS)	SAF/AC
Command Budget Automated System (CBAS)	SAF/AC
Automated Travel System (ATS)	SAF/AC
Joint Uniform Military Pay System (JUMPS)	SAF/AC
Departmental Accounts Receivable System (DARS)	SAF/AC
Air Reserve Forces Pay and Allowance System (ARFPAS)	SAF/AC
Accountability and Fund Reporting System	SAF/AC
Defense Integrated Financial System - FMS Support	SAF/AC
Base Contracting Automated System (BCAS)	SAF/AQ
Standard Base Supply System (SBSS)	AF/LE
Combat Ammunition System (CAS)	AF/LE
Core Automated Maintenance System (CAMs)	AF/LE
Contingency Operation/Mobility Planning and Execution System/Logistics Module-Base (COMPES/LOGMOD-M)	AF/LE
COMPES/Logistics Module-Major Command (COMPES/LOGMOD-M) Logistics Force Packaging (LOGFOR)	AF/LE
COMPES/Logistics Module-Logistic Feasibility Analysis Capability (COMPES/LOGFAC)	AF/LE
COMPES/Logistics Module Logistic Planning (COMPES/LOGPLAN)	AF/LE
Combat Fuels Management System (CFMS)	AF/LE
Cargo Movement Operations System (CMOS)	AF/LE
Fuels Automated Management System (FAMS)	AF/LE
On-Line Vehicle Interactive Management System (OLVIMS)	AF/LE
Air Force Equipment Management System (AFEMS)	AF/LE
Work Information Management System (WIMS)	AF/LE
PMEL Automated Management Subsystem (PAMS)	AF/LE
Red Horse Information Management System (RHIMS)	AF/LE

Services Information Management System (SIMS)	AF/LE
WIMS - Expansion (WIMS-E)	AF/LE
Site Automation System (SAS)	AF/LE
Integrated Graphics System (IGS)	AF/LE
Computer Aided Load Manifesting System (CALM)	AF/LE
Combat Supply System (CSS)	AF/LE
MAJCOM On-Line Aerospace Vehicle Trainer Reporting System (MOATRS)	AF/LE
Combat Logistics System (CLS)	AF/LE
Comprehensive Engine Management System (CEMS)	AF/LE
Aerospace Vehicle and Equipment Inventory, Status and Utilization Reporting System (AVISURS)	AF/LE
Combat Supplies Management System (CSMS)	AF/LE
Micro-Computer System for POM Development (MICROPOM)	AF/PR
Base Manpower Data System (BMDS)	AF/PR
Command Manpower Data System (CMDS)	AF/PR
Security Police Automated System (SPAS)	AF/IG
Aerospace Safety Automation Program (ASAP)	AF/IG
Automated Hazard Abatement Program System (ahaps)	AG/IG
Sentinel Byte (Intelligence System) (PROTOTYPE)	AF/IN
Intelligence Data Handling System (IDHS)	AF/IN
Tactical Information Processing and Interpretation, Display and Control/Storage and Retrieval Segment (TIPI DS/SR)	AF/IN
TAC Information Processing and Interpretation System, Image Interpretation Segment (TIPI II)	AF/IN
Advanced Personnel Data System II (APDS II)	AF/DP
Personnel Concept III (PC III)	AD/DP
Combat Personnel Control System (CPCS)	AF/DP
Personnel Data System-90 (PDS-90)	AF/DP
Base Level Personnel System (BLPS)	AF/DP
COMPES/Manpower and Personnel-Base (COMPES/MANPER-B)	AF/DP
COMPES/Manpower and Personnel-MAJCOM (COMPES/MANPER-M)	AF/DP
Pipeline Management System (PMS and PMS-II)	AF/DP
Medical Readiness Assemblage Materiel System/Medical Materiel Management System - On-Line (MEDRAMS/MMMS-OL)	AF/SG
Computerized Occupational Health Program (COHP)	AF/SG
Coronary Artery Risk Evaluation (CARE) Program	AF/SG
Automated Commissary Operations System (ACOS)	HQ AFCOMS
Air Force Claims Information System (AFCIMS)	AF/JA
Air Force Justice Information System (AFJIMS)	AF/JA
Federal Legal Information Through Electronics (FLITE)	AF/JA
Judge Advocate General Data Automation Program (JAGDAP)	AF/JA
Chaplains Automated Pastoral Support System (CAPSS)	AF/HC
Standard Base Level Computer (SBLC)	AF/SC
Transportable Shelter System	AF/SC
Remote Job Entry Terminal System (RJETS)	AF/SC
Communications-Electronics Status and Reporting System (COMM/ELECT)	AF/SC
Air Force Capability Assessment Program (AFCAP)	AF/XO
Air Force Operations Resource Management System (AFORMS)	AF/XO

Wartime Aircraft Activity Reporting System (WAARS)	AF/XO
COMPES/Operation Planning Module (COMPES/OPSMOD)	AF/XO
Worldwide Military Command and Control System (WWMCCS)	AF/XO
Air Force Command and Control System (AFC2S)	AF/XO/SC
Critical Intelligence Communication (CRITICOM) System	AF/IN
Multicommand Command and Control System	
Air Traffic Control System	
Base Information Data Distribution System (BIDDS)	

CHAPTER III

TECHNOLOGICAL CHANGE

The difference in technology and applications information processing is lost in trying to separate communications processing and information flow. Computers transcend the traditional hardware limitations which defined where information processing started and ended. New methods of defining, categorizing and acquiring systems are required. The old telecommunications days are gone where the change cycle was slower and we had time to plan. Planners could phase their programs with the technological advances improving product line as new capabilities were introduced. Today, and more so in the future, earlier commitments are required to keep pace with change. The computer industry is expanding product options so fast only the most enlightened, dedicated, and flexible organizations are equipped to take advantage of the offering. And then, one must be continually alert to new industry developments to prevent loss of investment through improvements to existing capabilities. The Air Force computer acquisition community is not organized to keep pace with rapid technological changes. The experts say the industry is maturing, others say it has reached a plateau in preparation for greater accelerated growth. Here is the executives of industry outlook:

Executive Outlook

John F. Akers, IBM's Chairman and Chief Executive:

> We continue to invest for the long term, and we remain confident about the future of our industry and IBM.

Frederick Withington, independent analyst based in New York:

> There is a real possibility that the industry is maturing. . . In the highly developed markets--Western Europe, the US, and Japan--all the basic computer services are already being provided.

He also said

> The most likely growth areas are image processing, artificial intelligence and instructional and home computing.
>
> These markets have not tended to open up easily. So we are at a watershed. Either we're going to saturate or we're going to leap ahead into entirely new territory! IBM is becoming more profitable, but by effectively cutting back on what is invested in growth. That tends to support the thesis that the industry is maturing.

Edward Skiko, Vice President for Corporate Information systems, of General Electric Company, one of the world's largest computer users said,

> I don't think personally that the computer industry is maturing if maturing means topping out or slowing down. It seems to me that in everything from the row hardware technology all through the advances in systems and application software, you're continuing to see substantial acceleration of the technology. There will be much more extensive use of technology for things such as automated design and providing superior customer service . . . Communications within organizations and between vendors and buyers can be greatly facilitated. It does not seem to me that the overall opportunity to grow revenue within the industry is terribly limited. I think it's excellent.

George Christie, Chief Economist of McGraw-Hill Information Systems Co., said,

> Is it possible the industry is maturing? It's not possible; it's a fact. Maturity is exactly the word for it. It used to grow 15 percent a year, steadily, from the late 1960s to the early 1980. Now we're in a secondary growth stage of 5 to at least 10 percent.[1]

Industrial Outlook

The industrial outlook is for more growth and innovative approaches to developing products that service telecommunications and information processing requirements. Since the base telecommunications network is the basis for the Air Force mission, technical leadership and organizational discipline are needed to define requirements, be innovative in relation to the future, and have the vision and determination to act decisively in the face of change. Technical competence and the right pro-active organizational structure must be aimed at innovative approaches in visualizing operational requirements and satisfying them using future technologies in the near-term. Long-range planning initiatives are needed now to assess and set into motion those Life Cycle actions to program the operations, maintenance and replacement options that will modernize the systems through incorporation of change at optimum times. These systems provide the daily operational support needed to provide the administrative and business functions of all US bases worldwide. They operate the supply accounts, manage aircraft maintenance and operations, provide the data

base and support for finance, personnel, contracting, civil engineering, transportation, security police, base administration, mobility processing, hospital administration and message distribution functions. A breakdown in any one system becomes critical over short periods of time to the base mission. The lack of systems integration now effects the total base management efficiency. Although they may not be physically integrated, a data update or modernization enacted in one system must be developed, tested and released in total cognizance of its effect to the total base support functions. The next chapter focuses on the acquisition and Life Cycle Management of the standard systems that provide data processing support at the base level.

NOTES

CHAPTER III (Pages 8 - 11)

1. Peter Coy, Associated Press Writer, "Pundits Divided Over Whether Computer Industry Maturing," Montgomery Advertiser, 24 January 1988, p. 5B.

CHAPTER IV

THE BASE-LEVEL ENVIRONMENT

The standard data systems supporting the base are the product of evolution. The concept of centralized data processing developed in the early 1960s by the Federal Government, grew from government's sponsorship of the computer industry and "large box" technology. Today, the concept remains the same but technology affords greater efficiencies through small box microprocessors performing unique functions throughout the base. The core of the base standard systems remains the Phase IV S1100 mainframe computer. Software is centrally developed, tested and released by the Standard Systems Center (SSC), Gunter AFS, by the Standard Systems Manager (SSM). The Phase IV system is operated centrally by an AFCC squadron to provide computer support to base level functional users who access the system through on-line computer terminals or micro-processors connected through the base central switching and cable distribution network. Numerous time-shared users are also remoted from on and off-base under a distributive architectural concept of maximized system availability to any DOD requested user. Eighty-seven Air National Guard and 11 Air Force Reserve units are serviced from our active duty bases.[1]

The increasing demand on the Phase IV system, saturation of base telecommunications switching networks, and need for decentralization of computer processing throughout the functional areas causes the Air Force functionals to seek their own capability using deployable and fixed microprocessors to perform their unique processing requirements. These systems remain independent data sources for transfer of functional data up to the MAJCOM and HQ USAF levels. Little has been done to integrate the data that transcends functional lines. The data is captured in "stove pipe" functional channels, requiring senior decision-makers to sift through duplicate information to perform additional analysis before presentation for decision making.

Our most critical issues are accepting the multitude of functional systems and embedding them into the base information processing and distribution system, then integrating the systems so they interrelate and work together at base and MAJCOM levels.

The evolvement of "stove pipe" systems presents a great challenge to the local communications' squadron commander. The systems were independently acquired from separate manufacturers without regard for future integration requirements and limitations on base cable distribution systems. An example of the integration problem is provided:

> The Air Force has subdivided the base level logistics functions into maintenance, supply, transportation and procurement organizations. Each of these areas acts as

> a separate entity solely reponsible for its own logistics tasks. The related data systems have evolved independently to support each of these areas. No significant integration of these isolated data systems has occurred just like it hasn't in the organizations they serve. The data systems strive for maximum efficiency within the specialized area without significant regard for the overall logistics system. Yet these systems are independent. For example, supply depends on maintenance for repairing reusable spares and maintenance depends on supply for components required for repairs. Supply gives a requisition to procurement which issues a request for quotation, invitation to bid, and a purchase order. Even though supply and procurement use the same computer, data is not shared. If supply and procurement shared common data and had on-line access to this data, manual processes would be eliminated, duplicate data entry would be reduced, and timeliness of service would be improved. The same opportunities exist in the sharing of data between supply and maintenance, logistics plans, supply and personnel, finance and just about every other major data system.[2]

This is one example of the many problems involving business and administrative functions computers now support. Although these systems were fielded under a "standardized" concept, the differences in manufacutre design, warranties, contractual obligations, and software developments to meet specific functional area requirements inhibits integration of the systems and dramatically reduces their potential use. The problem is severely compounded when the systems are independently fielded without engineering upgrades or provision for information distribution systems and other critical Life Cycle Management elements. The majority of our bases have completed the Phase IV installations and are in the final stages of engineering, installation and cutover of the Scope Exchange and Scope Dial systems to replace our

analog switches and outmoded cable plants with electronic digital switches and upgraded distribution systems. The additional infusion of multiple "stove pipe" systems with their required distributive networks has created demands on the base distribution system not accounted for in their previous design.

Although technology now allows us to multiplex voice and data over greater distances to provide economically feasible distribution networks for electronic integration of data, a base level architecture and heavy investment into integration of equipments and software are needed before we are able to give the user a computer that operates as flexible and friendly as the telephone.

The crux of the problem is being able to electronically integrate the "stovepipe" systems under an architectural concept that allows software and hardware enhancement under a common management philosophy. To develop and implement such an initiative requires centralization of authority for problem definition, requirements processing, engineering, acquisition, implementation and Life Cycle Management.

The next chapter reviews the Air Force Standard Communications-Computer Systems Life Cycle Management process and the acquisition procedures to meet legislative and DOD directives.

NOTES

CHAPTER IV (Pages 13-16)

1. Kenneth B. Heitkamp, Air Force Base-Level Information Systems, Air War College Special Project, Air University, Maxwell AFB, Alabama, April 1987, p. 51.

2. Ibid., p. 49.

CHAPTER V

POLICY AND PROCEDURES

> Combat support exists to meet combat operational needs. Without this support, combat operations are impossible. In the broadest sense, combat support is the art and science of creating and sustaining combat capability.[1]

Introduction.

Previous chapters have identified the problem, and placed into perspective the relationship between standard communications-computer systems, "stove pipe" systems and command unique systems. This chapter focuses on standard communications-computer system acquisition, and life cycle management (LCM).

Objectives

The objectives of this Chapter are to:

A. Describe the DOD and USAF policy concerning communications-computer system acquisition, and life cycle management.

B. Compare the AFR 700-series and 800-series regulation's procedures for implementing USAF policy for standard communications-computer system acquisition, and life cycle management.

C. Provide concerns pertaining to the acquisition, and life cycle management of standard communications-computer systems.

DOD and USAF Policy For Communications-Computer Systems Acquisition and Life Cycle Management

A. DOD policy. DOD policy for communications-computer systems management is established in numerous directives and instructions as identified in the Appendix. These directives and instructions are, in most cases, implementing public law, Office of Management and Budget (OMB) circular, or other DOD directives and instructions. The intent of these directives and instructions is to insure appropriate life cycle management, and address critical technical, cost and risk considerations which allow for the effective and economical system acquisition. In DOD directives and instructions communications-computer systems management is covered under the general topic of DOD Information Resources Management (IRM). For purposes of this chapter, communications-computer systems are included in the provisions of information technology which is a subset of IRM. Information technology is composed of such DOD resources as automatic data processing equipment (ADPE), telecommunications equipment, office information systems and other office automation used to manipulate or facilitate information handling, use, processing, storage, and management. DOD policy is clearly intent on implementing IRM aggressively to enhance mission performance through effective, economical acquisition and use of information.

The following DOD policy issuances relate to established communications-computer systems policy:

1. Management of Automatic Information Systems

a. DOD Directive 7920.1, "Life Cycle Management of Automated Information Systems (AIS)," October 17, 1978, establishes the process for administering the life cycle of an AIS with particular emphasis on the most critical early decisions that influence AIS cost and utility. The policy is stated that the early decisions shall be based on full consideration of functional, ADP, and telecommunication requirements in order to acquire an effective AIS.

b. DOD Instruction 7920.2, "Major Automated Information Systems Approval Process," October 20, 1978, sets the milestones review and OSD approval decision process and procedures for major AIS meeting high dollar value thresholds.

2. Information Technology Management

a. DOD Directive 7950.1, "Automated Data Processing Resources Management," September 29, 1980, authorizes the publishing of the ADP Resources Management Manual, DOD7950.1M, which sets forth procedures for reporting and inventorying, sharing, and reusing ADP resources. It also assigns responsibilities for management

visibility on in use DOD ADP resources, and cost-effective modernization of ADP support.

b. DOD Instruction 7935.1, DOD Automated Data Systems Documentation Standards," September 13, 1977, assigns responsibilities, and authorizes a standard for types of documentation, and requires that all AIS be documented according to these standards. Further, it sets forth the procedures for determining the extent of documentation required for each situation.

3. Information Resources Management is established in DOD Directive 7740.1, "DOD Information Resources Management Program." The DOD Information Resources Management (IRM) Program is designed to promote coordinated and integrated information management.

To emphasize DOD policy The Undersecretary of Defense for Research and Engineering stated in 1983 that DOD components are required to insure executive oversight responsibility which is clearly designated and are streamlined as possible; and, that program managers are assigned responsibility and authority to manage and be accountable for program performance.[2]

B. USAF Policy

1. 700-Series regulations. USAF policy pertaining to the management of information systems or communications-computer systems acquisition, and life cycle management is established in Air Force Regulation (AFR) 700-1,

Managing Air Force Communications-Computer Systems, 15 January 1987. AFR 700-1 pertains to all communications-computer systems regardless of category and provides the foundation for the 700-series regulations. The policies stated in AFR 700-1 are that (1) communications-computer systems will be developed and modified only on the basis of documented and validated minimum essential requirements, (2) systems will be acquired at the lowest total overall life cycle cost, and (3) life cycle management will be emphasized. Further, AFR 700-1 establishes management policy, objectives, and responsibilities. Section A, Life Cycle Management (LCM) of Communications-computer Systems, emphasizes LCM, and Paragraph 6 states:

> Life cycle management begins with planning and continues through information requirements processing, program management, and the operational life of the system. System managers, under a life cycle management approach, will place emphasis on strengthening the early decisions which shape systems reliability and maintainability, costs, and utility. Life cycle management will also emphasize management audit and accountability, logistics support, life cycle planning and costing, competition, preservation and disposition of information, and the appropriate level of management supervision.[3]

It is important to point out that USAF Life Cycle management policy applies to the management of all Air Force communications-computer systems. The life cycle management phases are defined as planning, requirements processing, program management, and operational management. The planning phase is documented in AFR 700-2, Information System Planning. Planning responsibility is assigned to

functional and system managers at all levels. Planning activities are documented in system planning documents. The second phase, requirements processing, flows from the planning phase and begins with identification of a user shortfall. A review of the technical solution to the shortfall is performed by the appropriate communications-computer systems board (CSRD) to validate and prioritize the requirement and approve the solution if it has the authority and funds to do so. AFR 700-3, Information Systems Requirements Processing, provides detailed guidance on processing systems requirements, and AFR 700-5, Information System Requirements Board, further defines the role of CSRB. After a system has been approved and funded the program management phase begins. This phase is covered in AFR 700-4, Information System Program Management and Acquisition. This regulation governs the acquisition, acceptance, and implementation through commissioning. During this phase of the system life cycle, a program manager is designated. The program manager is responsible to control systems development and ensure directives, plans and guidance are complied with. The program manager is also responsible for the review and audit of the developing program to ensure the program meets the validated information requirement at the lowest total life cycle cost. The final phase of the life cycle of communications-computer systems is the operational management phase. During this phase, functional and systems

managers emphasize whether systems remain cost effective and satisfy the original validated requirements. Functional and system managers initiate action for upgrade or replacement of systems. AFR 700-6, Information Systems Operation Management, AFR 700-7, Information Processing Center Operations Management, and AFR 700-8, Telephone Systems Operation Management provide USAF guidance, policy and procedures governing this phase.[4]

2. 800-Series Regulations. While the 700-series regulations provide the basis for communications-computer systems acquisition and life cycle management, there is an important interface with the 800-series regulations. The 700-series regulations do not provide policies and procedures for the identification and processing of Statements of Operational Needs (SON), Justification for Major New Start (JMSNS), and Joint Service Operational Requirements (JSOR). Communications-computer systems requirements which must be processed using a SON, JMSNS, and JSOR are processed in accordance with AFR 57-1, Operational Needs, and the acquisition phase of those communications-computer systems and resources acquired using the AFR 800-series regulations. For these requirements the program management directive (PMD), will designate the applicability of the 700-series and 800-series regulations. The HQ USAF functional staff office preparing and issuing the PMD will use the criteria in AFR 700-4 for determining the applicable

series regulation. AFR 800-2, Acquisition Program Management, 16 September 1985, with AFR's 57-1 and 55-24, System Operational Concept, prescribe the system acquisition procurement appropriations, and the Research, Development, Test and Evaluation (RDT&E) appropriation. Also, Major systems acquisition programs that are designed by the Secretary of Defense (SECDEF) as an Air Force Designated Aacquisition Program (AFDAP) must be managed according to AFR 800-2. AFR 800-2 requires the PMD to identify the implementing command. The command or agency so designated by Headquarters, USAF will manage the acquisition program. The implementing command appoints a Program Manager (PM) who ensures that all program documents are prepared and issued. The PM prepares and issues the Program Management Plan (PMP) for managing the acquisition program in accordance with AFR 800-2, attachment 3. Another important role of the PM is to manage the Integrated Logistics Support Program (ILSP), per AFR 800-8, until Program Management Responsibility Transfer (PMRT). The ILSP contains the essence of the life cycle management requirements and the implementing command transfers management of the program to the supporting command, in accordance with AFR 800-4, Program Management Responsibility Transfer, or as directed by HQ USAF.[5]

Comparison of AFR 700-Series/800-Series Procedures for Implementing Acquisition and Life Cycle Management

A. As stated above the 700 and 800-series regulations drive the requirements for acquisition and life cycle management. Each has a specific area of application and is applied to the requirements within its own sphere. Generally, the 700-Series pertains to commercial off-the-shelf communications-computer systems, and the 800-series deals with systems requiring research and development effort and R&D applications. The 700-series has been developed and continues to evolve, to separate from the normal 800-series management (which was intentionally designed for R&D), the less complicated but critical commercial off-the-shelf procurements.

B. Tables 1 and 2 provide a comparison of the plans required by the 700 and 800-series regulations and which regulations govern these plans. Study of the tables shows that a number of the basic requirements for program management and life cycle management using either regulation series are governed by many of the same policies and procedures in both regulations. The differences on the tables are due to the evolving nature of acquisition and life cycle environment of communications-computer systems, and the differences between standard, command unique, and off-the-shelf systems. Acquisition and life cycle management under one series does not mean that management

TABLE 1

PLAN NOMENCLATURE COMPARISON

AFR 700-1	AFR 800-2
Endurability Support Plan	Program Management Plan
Security Support Plan	<None>
Security Support Plan	Security
Training Support Plan	Personnel Training
Contracting & Acq Plan	Contracting
Source Selection Plan	Source Selection Plan
Configuration Mgt Support Plan	Configuration Mgt Plan
Software Development Support Plan	Software Development
Engineering and Installation Support Plan	<None>
Hardware and Software Turnover Sup Plan	Transfers and Turnovers
QA Support Plan	QA Support Plan
TEMP	TEMP
Logistics Support Plan	ILSP
Maintenance Support Plan	Maintenance Support Plan
Manpower	Manpower & Organization
Financial	Financial
LCC Management	LCC Management
<None>	Risk Analysis
<None>	Manufacturing
Contractor Data	Contractor Data
Systems Engineering	Systems Engineering Mgt
System Safety	System Safety
Baselining	Baselining
AFR-400-26	Program Management Responsibility Transfer Plan
Business Strategy Plan	Business Strategy Plan

TABLE 2

REGULATION COMPARISON

AREA	700-SERIES	800-SERIES
PROGRAM MANAGEMENT	AFR 700-4	AFR 800-2
ENDURABILITY	AFR 700-4	<700-Series Only>
SECURITY	AFR 700-10, AFR 205-16, AFR 205-4	AFR 205-37, AFR 205-1
TRAINING	AFR 50-8, AFR 50-9	AFR 50-18, AFR 50-8, AFR 50-9 AFR 50-11, AFR 800-4
CONTRACTING/ACQUISITION	AFR 700-4	FAR 34.004, FAR 55-24
SOURCE SELECTION	AFR 70-15	AFR 70-15
CONFIGURATION MGT	AFR 65-3	AFR 65-3
SOFTWARE DEVELOPMENT	MIL STD 1521B, DODD 7935.1	MIL STD 1521 B, DODD 7935.1
ENG & INSTALLATION	AFR 700-4	<700 Series only>
CIVIL ENGINEERING	AFR 85-1, AFR 86-1, AFR 86-2 AFR 93-1, AFR 80-22, AFR 89-1 AFM 172-1, AFR 19-2	AFR 86-1, AFR 80-22
TURNOVER	AFR 700-4	AFR 800-19
QUALITY ASSURANCE	AFR 74-1	AFR 74-1
TEMP	AFR 80-14	AFR 80-14
LOGISTICS SUPPORT	AFR 400-26	AFR 800-8, AFR 800-36, 400-26
MAINTENANCE SUPPORT	AFR 66-14	AFR 66-14
FINANCIAL	AFR 800-6, AFM 172-1, AFR 700-11	AFR 800-6, AFM 172-1, AFR 700-11
LCC MANAGEMENT	AFR 800-11	AFR 800-11
RISK ANSLYSIS	<3600 funds only>	AFR 800-37
MANUFACTURING	<Production only>	AFR 800-9
CONTRACTOR DATA	AFR 310-1	AFR 310-1
SYSTEMS ENGINEERING	AFR 700-4	AFR 800-3, MIL STD 499/1388-1A/2A
SYSTEM SAFETY	AFR 800-16	AFR 800-16
BASELINING	AFR 800-25	AFR 800-25
ECONOMIC ANALYSIS	AFR 178-1	AFR 178-1
BUSINESS STRATEGY PANELS	AFR 70-14	AFR 70-14
PROGRAM MANAGEMENT RESPONSIBILITY TRANSFER	AFR 400-26	AFR 800-4

systems under the other series are excluded from consideration or use. However, as stated earlier the 800-series regulations are primarily used R&D acquisition programs.[6]

C. Because of the nature of a program which is acquired under the 800-series, a very rigid vertical management structure is inherent. The 800-series implementing command or agency, designated by HQ USAF, is usually Air Force System Command (AFSC). The implementing command (800-series) appoints a Program Manager (PM), establishes the PM's charter, states the PM's relationship with participating commands, and sets forth the line authority over the PM. The PM (800-series) then manages the program by using the assistance, advice, and recommendations of participating commands. The vertical management structure extends throughout the acquisition and life cycle process. The program management plan covers all aspects of the life cycle of the system being acquired. It addresses clearly and explicitly program objectives, schedules, tasks, risks, participants and their interrelationships, resources required and overall strategy. Through such documents as the logistics and manpower and organization sections the PM has a complete view of the program from a vertical perspective, and probably more importantly, complete vertical control of the program.

D. The 700-series regulations attempt to impose the same management concepts and procedures in the system acquisition process and life cycle processes as the 800-series. The 700-series regulations, however, lack the rigidity, maturity, and vertical management control of the 800-series regulations. Although the program manager is given full responsibility with many program functions reporting directly to him or her, a horizontal management structure is necessary and many times parallel management structures in the implementing activity, the requiring activity, Air Force Logistics Command, and the host command or commands. While AFR 700-4 states that the implementing activity appoints the PM and the PM is given the authority and necessary resources to manage assigned programs, the PM must manage and implement the program with the aid, advice, and coordination of requiring, implementing, and supporting activities' Program Action Officers (PAO). The key difference between the 700-series and 800-series program manager is that the 800-series program has two management tools which are more effective than those available to the 700-series program manager. First is the differences between the 800-series Integrated Logistics Support Plan (ILSP), which is part of the Program Management Plan (PMP) and the 700-series Logistics Support Plan of the Information Systems Program Plan (ISPP). The ILSP is a comprehensive document required by AFR 800-8 and addresses life cycle management from cradle

to grave. The ILSP is Section 9, Logistics, of the PMP, and while the PMP is not required to be approved by HQ USAF (unless specifically directed in the PMD), the PMP does require input and concurrence from all participating commands. Another important point is that Integrated Logistics Support is programmed, budgeted and funded as an integral part of the acquisition program. The Logistics Support Plan of the ISPP (700-series) is developed using guidance from AFR 400-26, Logistics Support for Ground Communications-Electronics (C-E) Systems and Equipment. Specific funding is not provided to the PM or AFLC for implementing the Logistics Support Plan. The second key difference is that of Program Management Responsibility Transfer. As stated earlier AFR's 800-4 and 800-2 require detailed PMRT planning and execution. The 700-series regulations do not directly require PMRT planning or execution, but only address PMRT indirectly through AFR 400-26.[7]

Concerns Pertaining to the Acquisition and Life Cycle Management of Standard Communications-Computer Systems

A. The first concern that can be derived from the discussion in this Chapter is centered around program management. As stated earlier the 800-series program management process has evolved with a vertical orientation and been refined as the acquisition process changed. The 700-series program management is still evolving and instead

of having a vertical orientation with ultimate responsibility and authority in the PM, it retains the horizontal orientation, with diffused responsibility and authority. The concern is that the horizontal management orientation places the PM in the position of not being able to control his or her program, and not being able to deliver the best acquired and life cycle managed program. With the horizontal program management approach to acquisition and life cycle management, the functional support remains in the functional chain of command, and is therefore subject to the inherent functional influences and not always responsive to or supportive of the PM. 700-series program managers who are responsible for standard systems and COTS systems face the concern stated above. The relationship and interface between AFLC and AFSC in the program management of an 800-series acquired programs provides an example how the above concern can be reduced or eliminated. AFSC is usually designed as the implementing command and AFLC is designated as the supporting command. In the process of program management AFLC will assign a Deputy Program Manager for Logistics (DPML) or an Integrated Logistics Support Manager (ILSM) to work for the PM. The PM is responsible for the accomplishment of the Integrated Logistics Support (ILS) functions in any acquisition program (AFR 800-2). However, in this relationship the PM assigns all or part of the ILS responsibility to the DPML/ILSM, and retains final

responsibility and authority for ILS. The DPML/ILSM receives technical support from the Air Logistics Center (ALC) work force (from the ALC designated as final support center) to ensure all follow-on logistics matters are considered. The result of this process is a fully funded program with dedicated management. The PMs for standard and "stove pipe" communications-computer systems acquisitions do not always have this support or this type of working relationship with the supporting command, whether AFLC or another command. Successful interface between 700-series implementing and supporting activities has been successful in the past only because of intense management effort, in spite of the horizontal management orientation.[8]

B. The second concern is that the procedures in the 700 and 800-series regulations, while they have the identical purposes, use different procedures and terminology. The requirement to use 700 and 800-series regulations are repeatedly referenced in both sets of regulations with often confusing results. While there is evidence that the regulations are slowly being revised to make taskings generic, as an example AFR 800-8 now refers to implementing, supporting, and using commands instead of just AFLC or AFSC, most of the remaining 800-series and 700-series regulations have not been standardized. AFR 700-4, as an example, refers to implementing, and requiring activities and host commands

while AFR 800-2 refers to implementing participating, supporting, and operating commands. (See Appendix for more examples of differing or conflicting definitions.)

This Chapter has described DOD and USAF policy concerning communications-computer system acquisition and life cycle management; compared the procedures of the 700 and 800-series regulations; and provided concerns about the application and effectiveness of these regulations. The next Chapter will look at the evolution of standard systems, their application at base level, and the challenges facing the standard systems manager during the operational and support phase of the system's life cycle.

NOTES

CHAPTER IV (Pages 18 - 34)

1. Combat Support Doctrine. Air Force Manual 2-15 (Washington: Department of the Air Force, 13 December 1985), p. 1-1 (paragraphs 1-4).

2. Letter, The Undersecretary of Defense for Research and Engineering to Secretaries of the Military Departments, Subject: Acquisition of Computer Resources, 4 March 1983.

3. Managing Air Force Communications-Computer Systems, Air Force Regulation 700-1 (Washington: Department of the Air Force, 15 Janaury 1987), p. 2 (Section A, paragraph 6).

4. Ibid, p. 2.

5. Acquisition Program Management. Air Force Regulation 800-2 (Washington: Department of the Air Force, 16 September 1985), pp. 2-5 (paragraph 2).

6. Study, AFCC/AFLC Working Group (Air Force Logistics Command, Deputy Chief of Staff Plans and Programs), Subject: Communications-Electronics Roles and Mission Study, 9 July 1987.

7. Ibid, pp. 18-21.

8. Ibid, pp. 22-24.

CHAPTER VI

SYSTEMS MANAGEMENT

Introduction

The task of Life Cycle Management (LCM) of standard base level communications-computer systems for the Air Force is without question a difficult and complex task. The overall LCM task has become increasingly more complex as the number of micro and mini computers which support standard base level functions have exploded on the scene at bases throughout the Air Force. This chapter will look at the evolution of standard base level computer systems in the Air Force, describe the current base level communications-computer systems environment, and describe the players in the Life Cycle Mangement process along with their associated responsibilities. The major thrust will be toward the system management challenges facing the Standard Systems Manager during the operational and support phase of LMC, that is after the standard system has gone through the acquisiton and development phases and is operational. We will focus on some actual LMC experiences related to the biggest computer acquisition ever in the government, the Phase IV program and how LCM (or system management as it is now called) is being applied for some of the standard mini and micro computer systems. After examining these two situations, we will try to provide some suggestions for

applying and implementing life cycle or system management across the spectrum of large, medium, and small standard communications-computer systems which make up today's base level environment. (See Figure 1)

Organizational Responsibilities

Many organizations and people participate in the acquisition, production, operation, and maintenance of standard communications-computer systems throughout the systems life. This section identifies some of them and briefly explains their responsibilities.

A. Assistant Chief of Staff, Systems for Command, Control, Communications, and Computers (AF/SC). In 1984, an Air Force reorganiation created the Assistant Chief of Staff for Information Systems (AF/SI). At the same time the Air Force changed the way it managed its base-lvel Data Processing Centers (DPC) and Telecommunications Centers (TCC). Under the new concept, base-level data processing and communications responsibilities were combined into a single organization. In 1986, AF/SI was renamed the Assistant Secretary for Command, Control, Communications, and Computers (AF/SC). AF/SC is an adjunct to the Office of the Chief of Staff. It is independent of the basic Air Staff structure and is responsible directly to the Air Force Chief of Staff. AF/SC advised and supports the Chief of Staff and Air Staff regarding command, control, communications, and computers and serves as the HQ USAF

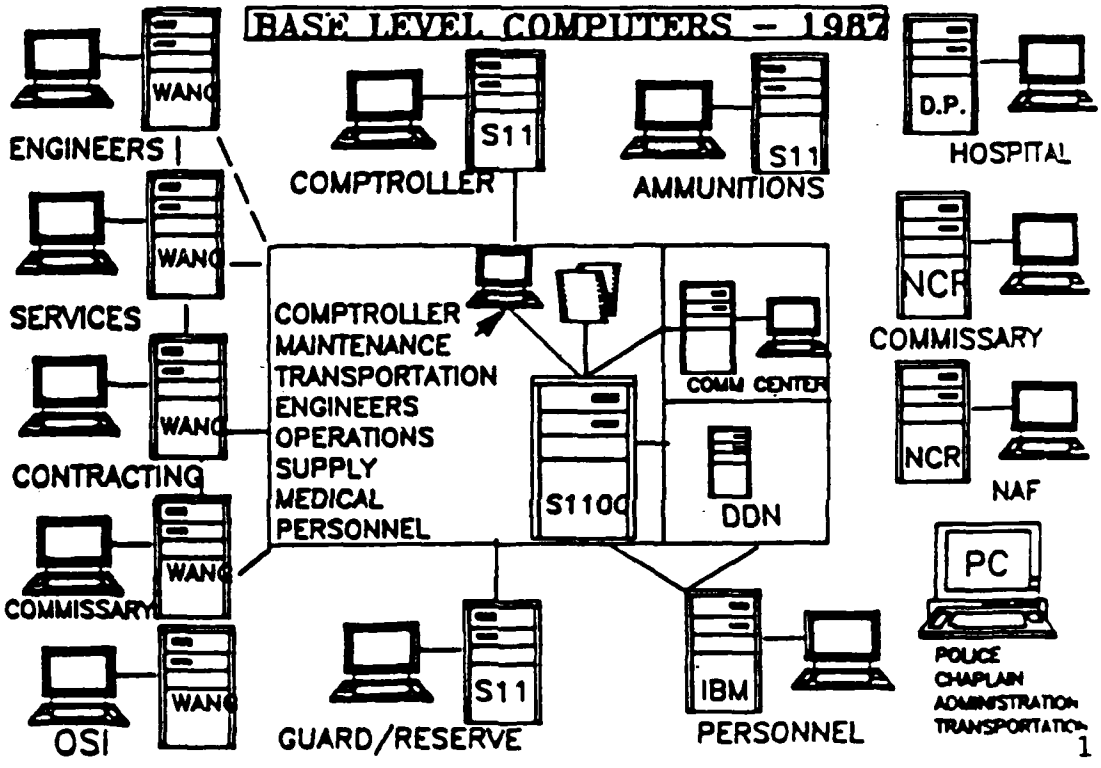
BASE LEVEL COMPUTERS - 1987
WANG
ENGINEERS
WANG
SERVICES
WANG
CONTRACTING
WANG
COMMISSARY
WANG
OSI
S11
COMPTROLLER
S11
AMMUNITIONS
D.P.
HOSPITAL
NCR
COMMISSARY
NCR
NAF
COMPTROLLER
MAINTENANCE
TRANSPORTATION
ENGINEERS
OPERATIONS
SUPPLY
MEDICAL
PERSONNEL
S1100
COMM CENTER
DDN
PC
POLICE
CHAPLAIN
ADMINISTRATION
TRANSPORTATION
S11
GUARD/RESERVE
IBM
PERSONNEL

Figure 1

Functional Manager for Communications-Computer Systems. The salient AF/SC authorities and responsibilities regarding communications-computer systems include:

1. Produces doctrine, objectives, concepts, plans, policies, standards, and procedures for communications-computer systems.

2. Develops and maintains the Air Force communications-computer architectures. Initiates communications-computer systems interoperability, interconnectivity, and integration actions to improve security, survivability, endurance, operational capabilities, and readiness of Air Force communications-computer systems.

3. Ensures communications-computer systems resource requirements are identified and considered in the programming and budgeting activities.

4. Reviews, directs, changes, and terminates system requirements, directives, plans, and other documents to obtain effective and efficient mission support.

5. Designates organization's responsibility for management of standard communications-computer systems. MAJCOMs must submit requirements affecting standard communication-computer systems to the appointed manager for review and coordination prior to approval.

6. Directs Air Force participation in government information processing standards programs.

B. Air Force Communications Command. AFCC is a critical support command with over 58,000 people providing support to every other Air Force operational and support command. A principal AFCC mission is to provide communications and computer support for the Air Force, other agencies, and designated command and control systems.[2] AFCC is responsible for managing the design, production, acquisition, and life-cycle operation and maintenance of standard communications-computer systems. The salient responsibilities regarding communications-computer systems include:

1. Develops policies, plans, and budgets for communications-computer systems.

2. Centrally manages standard communications-computer systems from the conceptual phase through the end of the operational phase.

3. Analyzes existing and proposed communications-computer systems and satisfies operational requirements by making optimum, economic use of technology and achieving compatibility with other communications-computer systems.

4. Directs subordinate units responsible for providing support for standard communications-computer systems that includes analysis, procurement, design, production, test, operation, and maintenance. Satisfies HQ

USAF-approved integration and interface requirements for assigned communications-computer systems.

5. Directs subordinate units responsible for serving as the Air Force central acquisition agencies for computer systems.

C. MAJCOM Communications-Computer System Divisions. All MAJCOMs, with the exception of Air Force Logistics Command (AFLC) and Alaskan Air Command (AAC), have an AFCC Communications-Computer Systems Division assigned to operate, maintain, plan and program for AFCC communications-computer facilities and services supporting the respective MAJCOM. Each is an AFCC Division--an intermediate command, reporting directly to the Commander, AFCC. Each serves as the MAJCOM Deputy Chief of Staff for Communications-Computer Systems to be sure MAJCOM interests are adequately represented in intercommand/agency discussions on MAJCOM issues. These divisions command assigned personnel and units that provide base communications-computer system services on bases within the MAJCOM. The MAJCOM exercises operational control over those systems operated by AFCC organizations for the exclusive support of the MAJCOM. Similarly, the host wing/base commander exercises operational control over those facilities operated by an AFCC organization for the exclusive support of the base and its tenants.

D. Standard Systems Center (SSC). The Standard Systems Center (SSC) is an intermediate headquarters of AFCC. It provides for the acquisition, design, production, and life-cycle management of standard communications-computer systems at bases and major commands world-wide.[3] The standard communications-computer systems normally assigned to SSC are those used by more than one Air Force major command. The SSC Commander is the Standard Communications System Manager (SCSM) for all standard communications-computer systems assigned to SSC.[4] SSC is located at Gunter Air Force Station in Montgomery, Alabama. SSC evolved from the Supply Systems Design Office and the Maintenance Systems Design Office in the early 1960s, the Data Automation Design Office (1963 - 1967), the Air Force Data Systems Design Center (1967 - 1984) and the Air Force Teleprocessing Center (1984 - 1986). The SSC provides support for standard communications-computer systems from the conceptual phase through the end of their operational life cycle. SSC provides communications-computer systems acquisition, production, maintenance, and operations support. SSC has one subordinate office located at Tinker AFB and four subordinate directorates located at Gunter AFS which are each directed by a Deputy Chief of Staff (DCS). Each DCS organization is briefly discussed below.

1. The Requirements and Programs Directorate is the focal point for communications-computer system

requirements. It analyzes information system requirements of standard and related systems to identify alternatives for new requirements and to determine system integration and optimization opportunties.

2. The Acquisition Directorate is a program management organization that acquires, produces, and implements standard computer and communications hardware and software systems. Acquisition examples include the multi-billion dollar Phase IV program and the recently cancelled $100-million Inter-Service/Agency Automated Message Processing Exchange Program (I-SA AMPE) to replace large portions of the Defense Communications Systems (e.g., AUTODIN switches). Other program management and acquisition efforts include the Core Automated Maintenance System (CAMS), the Air Force Command and Control System (AFC2S) and the Defense Data Network (DDN). Upon completion of an acquisition, Program Management Transfer of Responsibility (PMRT) occurs to a life-cycle manager or, as currently defined, a Standard Systems Manager. For base-level information systems, this is normally the Maintenance and Modifications Directorate within SSC. This directorate has representatives from functional areas assigned to work with computer and acquisition specialists to be sure the systems provided satisfy user requirements. These specialists assist the respective functional areas in translating their requirements into implementable program plans.

3. The Maintenance and Modifications Directorate has an Air Force-wide mission to maintain software, documentation, and procedures for standard information systems. Representatives from over 30 functional areas work with computer specialists in maintaining the standard software, providing telephone assistance, and when necessary, providing on-site assistance to users Air Force wide. Systems include large and small systems for such functional areas as supply, maintenance, operations and mobility, civil engineering, accounting and finance, and others. It is important to note, for purposes of this paper, that it is the Maintenance and Modifications Directorate that causes the SSC to differ significantly from a typical Air Force Systems Command (AFSC) product division. Responsibility for a software system created or acquired by the SSC Acquisition Directorate normally transfers to the Maintenance and Modifications Directorate. On the other hand, AFSC product divisions transfer responsibility to AFLC or another major command for software support. This software maintenance relationship with the Acquisition Directorate will be discussed in more detail later on in this chapter.

4. The Systems Support Directorate performs life-cycle management of standard communications-computer systems at bases and major commands wordlwide. The spectrum of systems range from small microcomputers to large main frame computer systems. These computers provide the

core computer hardware components for the Air Force Communications-Computer Systems Architecture Infrastructure. This Directorate normally assumes system management responsibility for computer systems from the DCS for Acquisition after the computer system has been implemented in the operational environment. In fact, the commander of the SSC, has delegated to this DCS the responsibility of System Manager for all the standard communications-computer systems assigned to the Standard Systems Center.[5] As the life-cycle manager, or the Standard Systems Manager, this DCS serves as the single overall manager of assigned standard communications computer systems responsible for all aspects of systems support, as well as any system changes.[6] This Directorate also performs quality assurance, system testing, and preparation and distribution of software and documentation to bases around the world. The customer support unit provides 24-hour-a-day, 7-day-a-week telephone assistance to users of standard systems around the world. On an average day, this office handles 200-300 telephone calls. Also, this office handles problems that are less urgent using a formal difficulty reporting (DIREP) and feedback system. It must be noted that these customer support functions are performed only for those standard computer system applications which operate in the base level Data Processing Center (DPC) on the shared base level computer, i.e., the Phase IV UNISYS 1160. For the dedicated functional systems

that operate on the small or medium mini or microcomputers, such as the Zenith or Wang computers, these customer support functions are handled by the personnel dedicated to the particular functional system.

5. The Command and Control Systems Office (CCSO) at Tinker AFB, Oklahoma provides computer hardware and software programming for command and control, telecommunications, air traffic control, and meteorological systems.[7] This includes 20 major software systems worldwide on 18 different computer systems. The management of these systems are not discussed in this paper.

E. Base-Level Communications-Computer Systems Squadron (CSS). The base-level CSS manages and operates communications-computer systems and air traffic control facilities for the base. The Data Processing Center (DPC) is one of the many functions within the CSS. The DPC is a service organization providing computer support to virtually every base-level functional area. The user requirements normally dictate a 24-hour, 7-day-a-week operation. The DPC normally has two sections. The systems control section works with the functional users in scheduling computer support, receiving input, providing processing results, and providing data processing consultation services. The operations section usually operates the computers that produce the information needed by the functional areas. While this paper focuses on standard information systems, note that the

base CSS, as does AFCC, has responsibility for base-unique computer systems, telephone systems, word processing equipment, microcomputers, telecommunications systems, long-haul communications systems, crypto equipment, weather facsimile equipment, mobile radios, and public address systems. Further, the CSS has responsibility for the air traffic control facilities.[8]

Base Level Data Automation Standardization

The standardization of automated base level processing has evolved over 25 years. It started in 1962 with the standardization of the base level supply system using the UNIVAC 1050 computer. Standardization of automated systems for other base level support functions such as finance, personnel, maintenance, medical supply, and others began in the late 1960s. The phases of this standardization are shown below.

PHASE	FIRST INSTALLED	REPLACED	OLD COMPUTER	NEW COMPUTER	DESCRIPTION
I	1964	1983	PCAM	UNIVAC 1050	Automate SBSS
II	1968	1986	Burroughs 263	Burroughs 3500/4700	Automate remaining base-level functions
III	1968	TBD	Honeywell 200/800	Honeywell 6000	Modernize MAJCOM computer support
IV	1983	TBD	UNIVAC 1050 & Burroughs 3500/4700	UNISYS S1100 & S11	Provide new computers to replace old Phase I and II computers
SCRC	1983	1986	Zenith Z120	Zenith Z248	Provide standard microcomputer hardware & software
Follow-on SCRC	1986	TBD	Zenith Z120	Zenith Z248	Provide standard microcomputer hardware & software

9

Before standardization policies were established, each command independently implemented unique procedures and capabilities to satisfy their needs and the overall policies established by HQ USAF. Shortcomings associated with this

non-standardization included increased training for personnel rotated between commands, hampered deployments, and duplication of effort. Benefits resulting from standardization included reductions in costs and man-hours associated with the design production, implementation, and operation of the systems.

The major standardization emphasis today is to use hardware and software components from standard Air Force contracts. These include the Base-Level Data Automation Program (Phase IV) contract awarded to Sperry, the Small Computer Requirements Contracts (SCRC) awarded to Zenith, and the Air Force Minicomputer Multi-User System (AMMUS) contract awarded to Wang. These contracts provide powerful forces that encourage standardization. They also reduce the complexity normally associated with a new communications-computer system. The user does not have to be concerned with the hardware, maintenance, commercial software, training, pricing, and contract terms and conditions. The user can concentrate on the requirements, fundings, software development, and the implementation. Where appropriate, the user can test the proposed solutions to his requirements in a operational prototype environment at Mather AFB. Since these contracts form the basis for current and future base level standard communications-computer systems, and which collectively represent significant life-cycle management or system management challenges for the Standard System

Managers, these contracts and associated systems are described below.

A. Base-Level Data Automation Program (Phase IV). Phase IV is the largest computer acquisition ever attempted by the US government. The overall objective of the Phase IV program is to provide standard, cost-effective, responsive, and reliable computer support for a variety of Air Force base-level functions. The Phase IV contract is the primary source for satisfying base-level computing needs other than those using microcomputers. It is used for (1) automation functions supporting wing-level and below on a base, or (2) a function which requires use of existing Phase IV software. Phase IV is planned to be a care component of the base-level communications-computer system architecture until the year 2002. A total of 229 Burroughs and UNIVAC computer systems were replaced with 155 Sperry Phase IV computer systems at 119 locations. The Phase IV system (a Sperry 1100 computer) provides an infra-structure that can grow as needed to accommodate increasing processing requirements for up to 20 years (1983 up to 2002). In May 1986, the implementation of Phase IV computers was completed at all Air Force bases.

The Phase IV system is a large maninframe computer and it provides centralized computer support to base level users at active Air Force, Air Force Reserve, and Air National Guard installations. Base level users include

areas such as base supply, maintenance, accounting and finance, personnel, civil engineering, and other base level activities. The computer software that operates on the Phase IV system is considered Air Force standard software in that the exact same software runs at every computer location throughout the Air Force. This includes active, Reserve and Guard units. With the exception of the personnel system, the computer software for the Phase IV is centrally developed and distributed by the Standard Systems Center at Gunter AFS, Alabama. (The SSC organization was described earlier in this chapter.) The SSC is also responsible for administering the Phase IV contract and serves as the Phase IV Standard Communications-Computer System Manager.

B. *Small Computer Requirements Contracts*. Micro-computers are critical components of Air Force information processing. Air Force policy requires stand-alone small computer resource requirements to be satisfied from existing small computer requirements contracts. This includes word processing and office automation requirements. Waivers to this policy must be approved by HQ USAF/SCT. Standard requirements contracts currently exist for micro-computers and lapheld microcomputers. In addition to these, the Air Force is also planning to award a multiuser small computer requirements contract by early 1988. Air Force-wide standardization actions for microcomputers have produced tremendous benefits. Along with the Phase IV

contract, these small computer requirements contracts provide the core computer hardware components for the Air Force Communications-Computer Systems Architecture infrastructure. The benefits the standard computer contracts include improved standardization, integration, interoperability with significant reductions in hardware, software, and acquisition costs and time required for acquisition. Some additional background and status information on the small computer contracts is provided below.

1. In May 1982, the Air Force established an Air Force small computer office at the Standard Systems Center to foster Air Force-wide standardization of hardware, software, maintenance, physical interfaces, and communications interfaces. This office became the single Air Force focal point for establishing and managing standard small computer contracts. In October 1983, the Air Force and Navy jointly awarded Zenith Corporation the first Small Computer Requirements Contract (SCRC) for microcomputers. The contract's objectives were to obtain competitive pricing, standardize the microcomputers in the Air Force inventory, and streamline the ordering process to make it easier for users to obtain microcomputers. The initial contract was extended in March 1984 and again in November 1984. A follow-on SCRC was competively awarded to Zenith Corporation in 1986. Up to 90,000 IBM-PC compatible microcomputers (Z248s) will be purchased from this contract. These

microcomputers have shown that they can be powerful tools for increasing productivity and reducing costs. Today they are being used for a wide variety of functions such as word processing, suspense tracking, and planning of maintenance and flying schedules.

2. The relatively simple process for obtaining small computers and associated software was explained above. Each MAJCOM has Small Computer Technical Centers (SCTC) to encourage sharing of software, provide assistance to users, and to avoid spending resources to produce software that is available elsewhere.

C. Air Force Minicomputer Multi-User System (AMMUS). This contract was awarded to Wang Corporation in January 1986. It allows for up to 1,600 large minicomputers and associated equipment (e.g., printers, workstations) and software (e.g., word processing graphics) to be purchased. The contract can cover an 8-year period for the purchase of computers and another 3-years for maintenance of the equipment. The major requirements for this contract were the Work Information Management System (WIMS), Service Information Management System (SIMS), Base Contract Administration System (BCAS), and Air Force Commissary Service system. The Air Force Computer Acquisition Center administers this contract. However, the Standard Systems Center has responsibility for configuration management and requirements processing.

D. Air Force Standard Multiuser Small Computer Requirements Contract (SMSCRC). The systems that will be available from this contract will either be super-micro-computers or small minicomputers capable of supporting from two to 64 users. Access to the computers will be through standard microcomputer terminals. It is anticipated that the Air Force will buy about 22,000 multiuser computers from this five-year contract. A primary use of this computer will be to satisfy office automation requirements throughout the Air Force. The SMSCRC Request for Proposal was released to industry in March 1987. The contract is expected to be awarded by early 1988.[10] The SMSCRC contract is being administered by the Air Force Computer Acquisition Center. Configuration management and requirements processing is the responsibility of the Standard Systems Center.

Modernization and Future Base-Level Systems

As indicated earlier, the last Phase IV system was successfully implemented in May 1986. Through the implementation phase an effort was initiated to modernize the functional automated data systems (ADSs) on the large main frame Phase IV system. This modernization effort was to improve the efficiency and productivity of the ADSs using the capabilities provided with the new Phase IV computer. Parallel with the modernization efforts many functional areas took advantage of the capabilities offered by the mini

and microcomputers requirements contracts and moved their standard functional ADSs off the shared main frame system to the smaller computers. The software modernization efforts will continue for these applications on the S1100 to make the software more effective and productive. Also, those standard systems which have moved to the small computer systems will continue to install and maintain their existing systems as well as continue to incorporate new validated mission requirements.

The current and future trend of the functional areas to move their standard systems to the minis and micros has altered the original concept of using the single mainframe Phase IV computer as the central point for providing base level computer support to all functional areas. As a result, there has been a significant impact on the planned system management approach for base level systems. Instead of having to manage a single mainframe system, there are the minis and micros which must be managed too. The present day mix of computer systems and those projected for the future pose significant system management challenges for standard base level communications-computer system managers. (See Figure 2) To provide an insight into these challenges, we will review what was originally envisioned for applying system management to the Phase IV system along with a look at some things which have impacted the original concept.

FUTURE SYSTEMS

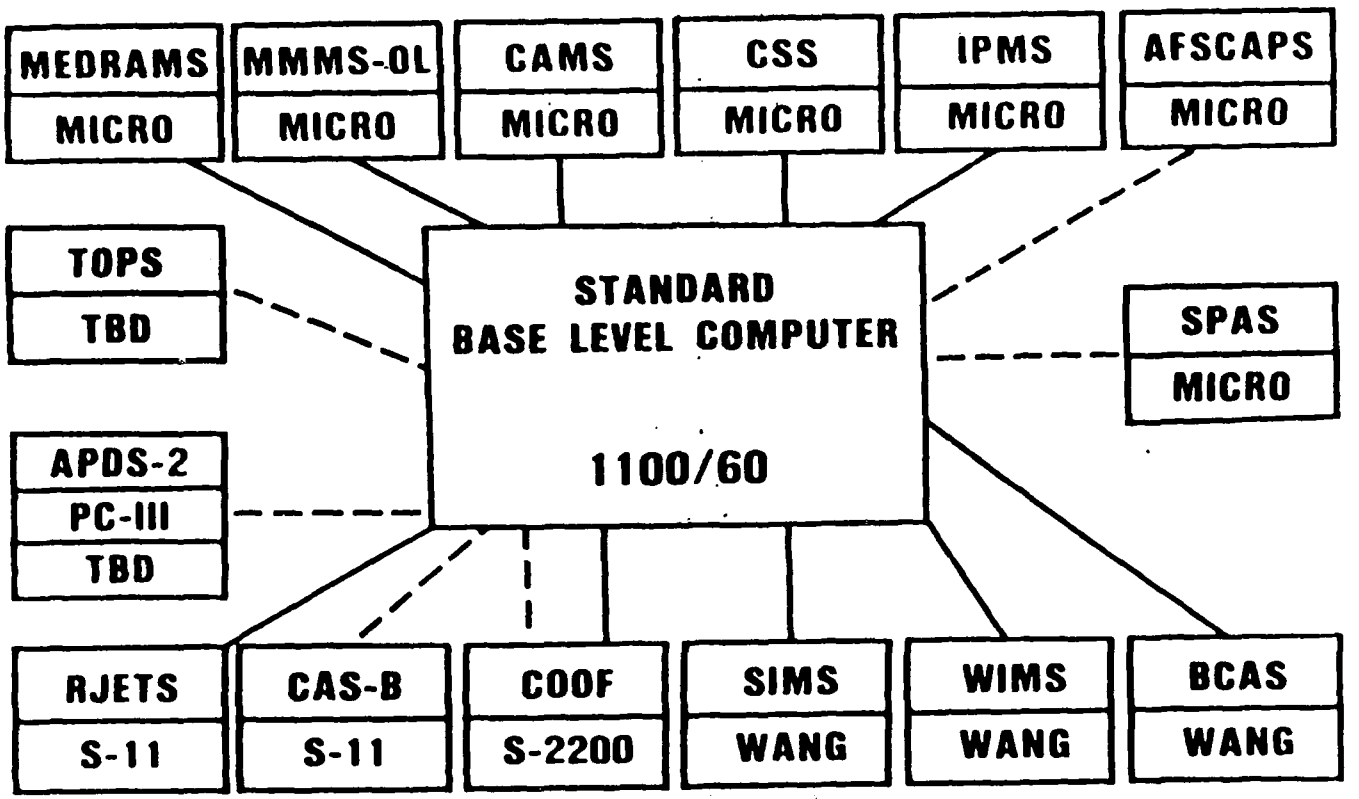

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Figure 2.

After looking at Phase IV, we will look at how system management functions are being addressed for the small mini and micro dedicated systems.

Systems Management Base-Level Systems

A. Large Mainframe Systems.

Prior to Phase IV, Automated Data Processing Systems (ADPS) Management, or systems management as it is now called, for the base-level computer systems (Burroughs 3500/3700) was centralized at the Air Force Data Systems Design Center (AFDSDC). As the USAF ADPS manager, AFDSDC was charged with the overall management of the Base Level Data Automation Standardization Program. These responsibilities included establishing and maintaining a Configuration Management System for processing changes to the ADPS; reviewing all major command requirements, and plans for computer systems to ensure compatibility with the standard systems; developing and maintaining standard software systems to support functional users; maintaining a field assistance office to provide solutions to problems identifed by users at the bases; maintaining standard systems software provided by the commercial vendor (Burroughs Corporation); researching and identifying hardware requirements to support future base level automated processing requirements; serving as the focal point for discussing with vendors hardware and software performance, equipment reliability, and new vendor products; maintaining a configuration analysis and

projection system which provides a description of current and projected workload requirements at all base data processing centers, to include equipment configuration, projected equipment upgrades, equipment costs, equipment maintenance data, as well as facilities and communications information; maintaining a data base on each Data Processing Center which provides an inventory and associated costs of all hardware, an inventory of all standard and unique software processed by the DPC or scheduled to be implemented, a historical workload profile by system, a list of projected hardware changes, a list of required and available physical space capacity for the system, the location and user of all remote hardware, and system utilization data down to the component level.[12]

As the foregoing indicates, the number and type of life cycle or ADPS management functions is extensive. The bulk of the responsibility for these system management functions was centralized at the AFDSDC in the Directorate of ADPS Management. This Directorate also served as the focal point for all liaison with the Air Force Automated Systems Program Office (AFASPO) during the acquisition and development phases of the Phase IV Program. As the installation of the individual Phase IV systems was completed and became operational, systems management responsibility for the individual systems was to pass from the AFASPO to the Directorate of ADPS Management. The

Directorate of ADPS Management was to pick up all the systems management functions described above for all the newly installed systems, and once all the Phase IV systems were installed and operational, Program Management responsibility was to transfer from the commander of the AFASPO to the AFDSDC. The AFDSDC was to have complete responsibility for all the Phase IV life-cycle management (or systems management) functions. It was to be the focal point for all actions affecting the life-cycle of the Phase IV system. However, several things occurred which significantly impacted the life-cycle management or systems management of the Phase IV systems.

During the implementation phase of the Phase IV program, at least two reorganizations took place which saw the AFDSDC and the AFASPO cease to exist as separate organizations. It is not necessary to provide the details of the reorganization other than to point out that these two organizations were dissolved and after a couple of iterations the Standard Systems Center was created. However, it should be noted that a prime objective of the Commander, Air Force Communications Command, for the reorganization was to provide "a thorough requirements review process" and to "create a logical flow from requirement through production to operation and maintenance.[13]

During the reorganization process, several factors had significant impact on life cycle management for Phase

IV: (1) acquisition functions were merged with system development and maintenance functions, (2) system maintenance and field support functions were split organizationally, (3) ADPS management (Systems Management) functions were split across different directorates, (4) the Phase IV contract was revised to allow major commands to buy directly off the Phase IV contract, (5) the automated systems used to support pre-Phase IV ADPS management functions such as configuration management, hardware inventory, and software control and distribution, were not available post-Phase IV; and (6) execution of the Phase IV Program Management Responsibility Transfer (PMRT) Plan resulted in a large amount of Phase IV program acquisition and implementation related documentation being transferred to the DCS for Systems Support, which organizationally, they were not prepared to accept. There was considerable confusion as to what functions were to be transferred to whom. Furthermore, unlike the AFSC/AFLC relationship in weapon system acquisitions, none of the personnel involved in the upfront acquisition and implementation efforts transferred with the program.[14]

What is the significance of all this? Very simply, it has had a serious impact on the ability of the Standard Systems Manager for Phase IV systems to carry out his system management responsibilities. Take for example, the lack of automated tools to provide system management functions such

as configuration management and hardware and inventory accountability. Without such tools it is virtually impossible to track what equipment has been ordered, installed and accepted at the bases and it is very difficult to answer questions such as "How much money have we spent on Phase IV equipment?" You cannot answer this type of question without a massive and lengthy paperwork exercise and even then the answer is basically nothing less than a best estimate.[15] Another example is the Phase IV contract change. This change allowed the major commands to buy equipment directly from Sperry. However, they are supposed to have all such orders approved by the Standard Systems Manager.[16] They don't always do this. As a result, equipment is installed on the "shared" Phase IV system at bases without the knowledge of the Standard System Manager. This severely limits the Standard System Manager's ability to effectively assess the impact of the additional workload on the performance of the overall system with any degree of accuracy. Any additional workload added to the "shared" S1100 system without being fully assessed for overall system impact could seriously degrade system response to an unacceptable level where functional areas would not be able to satisfy mission requirements. Besides systems performance, unilateral equipment acquisitions by the major commands, potentially run the risk that the price they pay for the equipment may not be the best price for the govern-

ment. The evaluation of contractor proposed substitutions and additions are continuous activities that take place between the Standard Systems Manager, contractor, and the Procuring Contract Office (PCO). As a result, the Standard Systems Manager is aware of potential price changes which would benefit the government. With this knowledge he can defer or delay equipment orders until price negotiations between the PCO and contractor are complete, thus taking advantage of any price reductions. Further, there have been instances where unilateral action by the major comannds have resulted in the purchase of new equipment when excess equipment was available. If the major command had coordinated with the Systems Manager (as required by the regulation) the major command would have saved his O&M dollars.[17]

Besides the confusion as to what functions would transfer to whom and the fact that no personnel transferred with the program, there is an additional aspect of the Phase IV Program Management Responsibility transfer that bears mentioning. There was not a full transfer of program authority and responsibility. While Systems Management responsibility for the operational Phase IV systems was picked up by the DCS for Systems Support (without any additional resources) the DCS for Acquisition continued to retain Program Management responsibility for major hardware acquisitions which were taking place off the Phase IV contract, namely the Transportable Shelter System (TSS), the

Core Automated Maintenance System (CAMS), and the Remote Job Entry Terminal Systems (RJETS). The significance of this is that the responsibility and authority for systems management of the standard Phase IV system is spread between the Standard System Manager (DCS for Systems Support) for the operational systems, and the Program Manager(s) (DCS for Acquisition) for the "add-on" programs, TSS, RJETS and CAMS. It is essential that the Program Managers for the "add-ons" and the Standard Systems Manager closely interact to ensure all technical decisions are made with full consideration of the impact on the overall Phase IV operational system. This situation clearly indicates that when program management actions and operational management actions are occurring in parallel for a single program it is somewhat difficult to establish "a single point of management, during every phase of system life, with sufficient authority, responsibility, and accountability for effective management and operation of the system," as is stated as Air Force Communications-Computer Systems Management Policy.[18] Also, one of the objectives of the Standard Systems Center reorganization was to "ensure clear accountability" of who is in charge of major programs.[19] Clearly, this objective was not achieved for the Phase IV Program.

B. Medium and Small Systems.

What makes the application of Systems Management different for small and medium systems over the large main

frame Phase IV S1100 system? Mainly, the Phase IV system is a "shared" system where computer support is provided to multiple functional users. As a shared system, it serves as a center of gravity for each base. When it is not operating properly, every functional area is affected.[20] By being a shared system, the Standard System Manager for the Phase IV systems has to be kept knowledgeable of all activities which could potentially impact the overall system. As new functional data systems are being developed for the shared S1100, or major changes are made to existing functional data systems, the Standard System Manager must actively interface with the various ADS Managers throughout the software development and implementation process to insure that the newly developed, or revised functional software, remains compatible and interoperable with existing systems, and in no way degrades computer support to any other functional user. At the same time the Phase IV Systems Manger must continually interact with the Program Managers responsible for the acquisition, installation, and implementation of the "add on" systems which are being acquired off the Phase IV contract. Also, he needs to be aware of any hardware being acquired by the major commands as well as any major command unique software applications being implemented on the shared system. The system manager must be in the loop for any actions related to the shared system. He has sole responsibility to insure that the shared system (hardware and

systems software) continues to provide equitable support across the spectrum of functional area users.

For the mini and micro systems a somewhat different situation exists. First, as indicated earlier, the big difference is the mini and microcomputer systems are dedicated systems as opposed to shared systems. They are dedicated in the sense that the hardware is dedicated to a single functional area. No other functional software operates on the hardware, that is, it is not shared with other functional areas. Figure 1, shown earlier, depicts various functional areas (Engineers, Contracting, Commissary, Hospital, Comptroller, etc.) and the dedicated hardware (Wang, Data Point, System II, National Cash Register, etc.) they use for computer support.

To set the stage for discussing system management for the small and medium computers, we need to briefly review how the current environment evolved. First, as we mentioned earlier, the majority of the current functional applications, which now operate on a dedicated mini or microcomputer, previously operated on the shared system, that is the Burroughs 3500/3700 which was replaced with the Sperry 1100. In this environment, functional area personnel and software development personnel, under the direction of an ADS Manager, were mainly concerned with the development and maintenance of functional software. Life-cycle management or system management responsibilities, dealing with

contract administration and configuration management of hardware and software, was centralized under a single ADPS Manager, and system support functions such as quality assurance testing, control and distribution of software and documentation to the bases, and providing field assistance to users of the system around the world, were performed mainly by support personnel assigned outside the functional area. Also, we need to keep in mind that the Standard Systems Center evolved and was organizationally structured to have four directorates which would provide the management support needed to sustain a communications-computer system throughout its system life, i.e., the DCS for Requirements and Programs for requirements validation; the DCS for Acquisition for managing program acquisition, installation, and implementation; the DCS for Maintenance and Modification for maintaining the operational functional software; and the DCS for Systems Support for providing systems management (or life-cycle management) support for the hardware and system software during its operational life, and providing customer support functions. As a system evolves through the requirements validation phase, responsibility and authority for the system is to move from the DCS for Requirements and Programs to the DCS for Acquisition for program management related actions. Following implementation of the system, software maintenance responsibility for the operational functional software would move to the DCS for Maintenance and

Modification while program management responsibility for life-cycle management of the operational hardware and system software would move to the DCS for Systems Support.

When the functional areas moved their applications off the large shared system to the minis and micros, they effectively combined program management and system management responsibilities with their already existing ADS management responsibilities. In effect, the ADS Manager picked up two additional management hats, one of a Program Manager and one of a System Manager. Not only did he remain responsible for maintaining the operational functional software on the shared system, but he also became responsible for the program management actions related to the installation of the micro/mini hardware along with the development and implementation of the new functional software on the micro/mini. After the new mini/micro hardware was installed and the new functional software on the micro/mini became operational, he has remained responsible for maintaining the functional software and providing all the customer support and field assistance functions. In effect, all ADS management, program management, and system management functions are being performed by personnel who previously were only concerned with maintaining an operational automated data system that operated on a shared computer.

An example of where management for a dedicated mini/micro system has been combined is the standard Base Contracting Automated System (BCAS). BCAS is an on-line system which operates on Wang hardware acquired off the Air Force Minicomputer Multi-User System (AMMUS) contract. BCAS is a replacement system for the Customer Integrated Automated Purchasing System (CIAPS), which operates in a batch mode on the shared Phase IV S1100 System. BCAS is currently being installed and implemented in base contracting offices throughout the Air Force. As BCAS is installed and implemented in the contracting offices on a particular base, CIAPS is removed from the shared S1100 at that base's data processing center.

The BCAS Program Manager, the BCAS System Manager, and the CIAPS ADS Manager are the same person. As the Program Manager, he is responsible for all the actions required to install the BCAS hardware and implement the standard BCAS software at base contracting facilities throughout the Air Force. As the System Manager, he is responsible for all the actions required to support and maintain BCAS during its operational life on the Wang hardware. As an ADS Manager, he is responsible for maintaining the operational CIAPS software on the Phase IV S1100 system. He wears three hats.

Nearly all the personnel who work on the BCAS are assigned to the DCS for Acquisition. They not only perform

the bulk of the life-cycle management and customer support functions, which the DCS for System Support normally provides for shared systems, but they also perform the entire range of software maintenance functions, which the DCS for Maintenance and Modification normally provides for those data systems that are operating in the field. The DCS for Systems Support serves only as a liaison between the BCAS Program Manager (and System Manger) and the Air Force Computer Acquisition Center (AFCAC) for contract related issues. Also, the DCS for Systems Support is the focal point between the Wang contractor and the BCAS Program Manager/System Manager for new system software releases and any other system related problems which the contractor must resolve. (In effect, the DCS for System Support only acts as the AMMUS contract monitor.) With the exception of the liaison and contract monitor functions, all the BCAS life-cycle management, or system management functions, are performed by dedicated BCAS personnel. With respect to CIAPS, the BCAS equivalent on the S1100, the DCS for Systems Support does provide the customer support functions (Quality Assurance, Field Support, Release Control and Software Distribution) that they normally provide for base level standard systems that operate on the shared Phase IV system.[21]

The above basically describes how program management, systems management, and ADS management functions are

centralized for BCAS. The bulk of the life-cycle management functions are done by a single group of functional and data automation personnel who are dedicated to the BCAS (and CIAPS) systems. There is no separation of acquisition, development, and implementation functions from operational maintenance and system support functions to fit the current Standard Systems Center organization structure. Responsibilities for the various life-cycle management functions have not passed from the DCS for Acquisition to the DCS for Maintenance and Modification (for functional software maintenance) and the DCS for Systems Support (for Configuration Management of hardware and software) as was envisioned when the current SSC organization structure was finalized.

There are several reasons why management responsibilities have not moved through the SSC as it is now organized. First, the SSC is still maturing with respect to the current "cradle to grave" organizational structure that is intended to support a system throughout its life. For example, more trained program management or acquisition specialists are needed to support the acquisition function. The majority of the Program Managers today are functional area specialists, e.g., medical, logistics, procurement specialists, transportation, communications-computer specialists, etc., who have not been trained as program managers. Second, when a program does transfer, the SSC experience to-date has mainly been that no resources

transferred with the program. This is unlike a typical Air Force Systems Command (AFSC) procurement, where selected manpower authorizations would transfer with the program to AFLC or another major command for system support.

Another significant factor is the high volume of changes which occur to the standard base level systems. These systems don't stabilize like embedded software in a weapons system. They are always being revised, either as the result of new requirements, or changes to existing requirements, or due to statutory changes. This constant state of change makes it very difficult to separate acquisition and development functions (which apply basically to new requirements or major revisions) from maintenance and modification functions (which is fixing system errors or incorporating minor revisions.) The instability of the functional system coupled with the fact that "we don't PMRT standard systems outside the SSC" (organization) makes it very difficult to separate program management, ADS management, and system management activities.[22]

The above scenario is not limited to the functional areas of "base contracting." There are a number of other functional areas where all or part of the Program Management, ADS Management, and System Management activities are combined and performed by personnel dedicated to a particular standard base level system. Some examples are:

Functional Area	Hardware	System Title
Engineers	Wang	Work Information Mgmt System Services Information Mgmt System
Comptroller	System II	System 2200 (Previously called Comptroller Office of the Future)
Hospital	Data Point	Medical Material Management System-On-Line

Are the functional areas satisfactorily performing the bulk of the life-cycle management or system management functions for their dedicated systems? If BCAS is representative of the other dedicated functional system users, then it appears the dedicated systems are being well managed. "Doing basically all the management actions related to implementing BCAS has allowed us to be much more productive. We have been able to respond much more quickly to field concerns. Contracting offices who have received BCAS much prefer it over CIAPS where they were just another user of the base level computer." Being able to direct questions or concerns regarding basically any area of the system to a single office has been a big factor in improving "customer satisfaction" with the base contracting community. Since the hardware is dedicated "we don't have to be overly concerned about additional workload put on the system, or the impact of proposed software changes on overall systems performance," as is the case on the shared system. As a result, new or revised functional requirement changes can be

"implemented much more quickly" than on the shared system. The impact assessment and evaluation is done almost completely by the people dedicated to BCAS. If technical assistance is needed it is normally provided by the personnel assigned to the "small computer office," who monitor the small computer requirements contracts, e.g., AMMUS.[23]

The small computer program office, which is located within the DCS for System Support and manages the small computer requirements contracts, is "mainly concerned with monitoring the contract and acting as a liaison between the dedicated system managers and the Air Force Computer Acquisition Center, and the contractors, for contract related issues. We don't centrally control the hardware and software for the small computers like we have to do for the big box system." The dedicated system managers are "responsible for handling just about all the management functions associated with fielding their systems and maintaining them." The program office monitors contractor compliance, monitors the status of equipment delivery orders (via on-line access to the contractor's ordering system), evaluates and tests new contractor products, processes contract modifications, keeps the field apprised of any activities related to potential contract changes for new hardware or software items that may be added to the contract(s), and performs other similar contract related functions. The

program office also works closely with the various dedicated system managers to identify, and add to the contract, any contractor services that could potentially benefit all users of the requirements contracts, e.g., training, software support services, site planning, etc.[24]

Summary

The systems management (or life-cycle management) infrastructure used to manage standard base level communications computer systems has clearly changed. Instead of a single central organization charged with the overall system management of the entire base level automation environment which consists mainly of a single shared main frame computer, we now have system management responsibility for base level systems spread across many different functional areas. This process has evolved as the result of functional areas moving their automated data systems off the central base computer to individual dedicated hardware which, in most cases, was acquired off standard Air Force small computer requirements contracts. Instead of a single large main frame computer being used for base level support, we have a mix of minis/micros spread across the base.

The System Manager responsible for life-cycle management of the Air Force's standard large main frame computer system (Phase IV) faces an impossible task. He is faced with performing life-cycle management of a computer system where concurrently there are major acquisition

efforts underway off the same contract., e.g., CAMS. In this situation, it's not always clear who the responsible authority is, the system manager or the program managers. The system manager must maintain a horizontal relationship with each Program Manager, who often maintains a vertical relationship with the air staff functional managers. Also, with major efforts being made to modernize the functional applications, as well as the continuing efforts to incorporate functional requirement changes, the system manager must interact horizontally with ADS managers throughout the software development process. The system manager must continually try to assess the impact of all standard system changes on the performance of the overall system. In addition to the horizontal relationship with the Program Managers and the ADS Managers, the system manager needs to be aware of any hardware of unique applications software the major commands implement on their systems. As was discussed in Chapter V, this horizontal relationship is characteristic of systems acquired under the 700 series regulations. Under the 700 series regulations, LCM after PMRT is decentralized to base level instead of being centralized with a system manager as is the case in AFLC under the 800 series regulation.

When the Phase IV contract was modified to allow the commands to purchase directly off the contract, centralized management of Phase IV computer resources was basically

lost. "The strength of the centralized ADPS Management approach for the Burroughs systems (pre-Phase IV) was that we always knew what was in the field and what was coming down the pike," in terms of hardware and software changes. "There were automated tools to help us track what hardware and software was at the bases, such as the Configuration Analysis and Projection System." Today, we don't have a system that brings configuration management, hardware ordering, bill paying, and software and hardware inventory functions together. This makes it nearly impossible to determine what computer resources are located at bases throughout the Air Force and to perform certain life cycle management functions such as projecting equipment maintenance costs. "A system like IPMS is sorely needed" so that life cycle management functions can be centralized and managed for the base level standard communications-computer systems, be they large, medium, or small.[25] IPMS will do a lot to bring together a number of the life-cycle management functions, but it will not solve the problem with the major commands implementing unique software on the shared system without advising the systems manager of the added workload. There is no real-time solution to this problem other than the major commands complying with (the regulation) and allowing the Phase IV Systems Manager to fully assess the impact of any major command unique software on the total system before it is implemented.

Besides the challenges facing the Phase IV system manager, our brief look at how system management is being applied for our base level computer systems revealed several other areas of concern. In today's environment we see individuals performing simultaneously as a Program Manager, ADS Manager, and as a Systems Manager. We see a number of program managers for some major programs who are functional area specialists as opposed to acquisition management specialists who have been formally trained as program managers. We see program management, software development, and life-cycle management functions being done by personnel dedicated to a single functional system, yet the systems management organization, in which this environment exists, (i.e., the Standard Systems Center) is structured basically to emulate the AFSC/AFLC environment where management responsibility moves to separate organizations as the system moves from the requirements phase to the operational and maintenance phase. We see systems PMRT within a single organization with no resources normally moving with the system due to the high volume of change associated with the systems, and the difficulty in separating acquisition and development functions from operation and maintenance functions.

Does this type of environment suggest that AFCC should not be the Air Force System Manager for the standard base level communications-computer systems? Should the

acquisition, development and follow-on life-cycle management of standard base level communications-computer systems be turned over to AFSC and AFLC? Some would argue that this should be the case, but there are a couple of things we need to keep in mind when discussing whether acquisition and maintenance of standard base level computer systems should be done by AFSC and AFLC. First, there is a large amount of research and development associated with weapon system procurements. This is not the case for standard base level communications-computer systems where associated hardware and system software are commercially acquired. Secondly, once embedded support software is operational for weapon systems (or the weapon system is in production) it remains fairly stable with little follow-on changes. In this environment, it is rather easy to separate maintenance (fix or repair) efforts from new development. This is not the case for standard base level systems where functional applications have shown a history of change, either modifying existing requirements or adding new ones. The continuous opening up of the software makes it difficult to separate operational maintenance activities from development activities.

Finally, there is one additional area our brief analysis of the current system management has revealed. Regardless of the series regulations used to field a system, there is no single organization looking at the total base

level environment from a communications-computer standpoint. We are continuing to develop base level systems on both the shared computer and the dedicated systems in a "stove pipe" fashion. There is little effort underway to integrate data bases between functional systems and to allow them to "talk" to each other. Integration of data bases and communications between systems has to come for base level systems! It is essential that these systems be developed so they can communicate with each other and are hardware independent. Our systems must be developed with an eye toward the future where multi-level functional data is accessible to commanders on a real-time basis. Our base level systems must be made to be interoperable.

NOTES

CHAPTER VI (Pages 36 - 79

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CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

The concerns stated in this paper are a result of the Air Force policy and procedures not maturing and keeping pace with the availability of funds to meet the immediate backlog of communications-computer system requirements for both standard and unique functional systems. The lack of updated guidance, coupled with the need to satisfy unique information processing system requirements drove the Air Force acquisition decisions which by-passed normal acquisition discipline. Because procedures did not stay abreast with actual acquisitions, life-cycle management and system integration suffered.

The following recommendations are provided as a summation of this paper:

A. While there is much work currently being done to revise the 700 series regulations, a new regulation combining the 700 and 800 series regulations, as they apply to acquisition and life-cycle management of communications-computer systems is required. This new regulation should address standardizing procedures and terminology. Standardized procedures are necessary so that acquisition and life-cycle management can be performed without using two different sets of procedures depending on the program

complexity, or requirement of the Program Management Document (PMD).

B. Regardless of whether Air Force System Command or Air Force Communication Command or any other command acquires a system, the Program Manager must have the total vertical authority for his program and be given the funds to provide total life-cycle management until PMRT. No system should be acquired unless life-cycle management is fully funded and this life-cycle management funding is affixed and transferred to the supporting command. Furthermore, life-cycle management should not be decentralized. The visibility of all standard systems (whether functionally acquired or integrated as part of the shared system) must be centralized either with Air Force Logistics Command or a standard Communications-Computer Systems Center as a direct reporting unit of HQ USAF/SC.

The life-cycle managment organization should be responsible for overseeing the entire standard base level communications computer systems environment. This organization should provide centralized LCM and should have engineering, acquisition, and management oversite for all standard systems (large, medium, and small) which operate in the base level environment. The centralized manager should be responsible for insuring systems being acquired or developed are being done in a manner consistent with Air Force Policy regarding the use of standard hardware

contracts, software development standards, use of portable operating systems, and fourth generation programming languages, etc. This organization would work closely with the organization responsible for the AF base level communications-computer system architecture. Acquisition Program managers and support system managers, regardless of system size, must be directly involved with the standard systems manager who is responsible for the current large "shared" system (Phase IV) in terms of configuration management, system performance, workload sizing, evaluation of new contractor proposed hardware and software, etc. This organization would also monitor the system managers on the small and medium dedicated computer systems to insure compliance with established systems management policy.

C. The centralized management organization should accelerate the activation of the Implementation Processing Management System (IPMS). IPMS is urgently needed now to support the System Manager for the shared S1100, however, this system should be considered as the Air Force standard base level configuration management system for all base level computer systems. (See Appendix for a description of IPMS.)

D. A restructuring of the Air Force's standard systems acquisition and life-cycle management processes, and organizational alignments is necessary if cost effective acquisiton and life-cycle management is to become a reality.

While much work is ongoing, if the basic relationships and structured realignments are not made, effective management of communications-computer systems is as questionable in the future as in the past.

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APPENDIX

DEFINITIONS

The definition of terms and systems as used in this paper is necessary as some slight differences exist between Office of Management and Budget (OMB), DOD, and Air Force definitions. The following terms contained in AFR 700-1, Attachment 1, 15 January 1987, and AFR 700-26 (C1), 25 November 1986 are presented for reference: 18 December 1987, are used for the purpose of this paper.

Command Communications-Computer System. Any communications-computer system not designed as a standard communications-computer system. These systems are typically managed by the command in which they operate.

Command Communications-Computer Systems Officer. An individual, designed by the commander, responsible for the overall management of communications-computer systems budgeted and funded by that command.

Communications-Computer System. A combination of equipment, procedures, and other resources used to process information. Processing proceeds from creation of the information by the system user to serial or concurrent phases of protection, analysis, storage, retrieval, and dissemination to intended recipients for disposition.

Embedded Systems. Information processing components specifically designed into, or dedicated to, a system as an integral part of the overall system, capable of satisfying only the requirements for which the system was designed.

Information. Any communications or reception of knowledge such as facts, data, or opinions, including numerical, graphic, or narrative forms, whether oral or maintained in any medium, including computerized data bases, paper, microform, or magnetic tape (Office of Management and Budget (OMB) Circular No. 1-130).

Information Resource Management (IRM). The planning, budgeting, organizing, directing, training, and control associated with government information. The term encompasses both information itself and the related sources, such as personnel, equipment, funds, and technology (OMB Circular No. A-130).

Standard Communications-Computer System. An Air Force communications-computer system that affects more than one MAJCOM and requires centralized oversight in planning, design, development, system implementation, operation, or maintenance. It is normally characterized by some or all of the following: high cost, multiple interfaces, multicommand users, or Air Force-wide system objectives and is designated in Table 2.2, AFR 700-3.

Standard Communications-Computer System Manager. The individual or organization designated in table 2-2, AFR 700-3, manage a standard communications-computer system.

Small Computer.

a. The term small computer is generic and refers to a specific class of equipment to include associated peripherals and software. It will be the primary end-user device for connection to networks as well as providing stand-alone processing capability. It has the capacity to execute various software programs and usually consists of at least a keyboard, disk drive, visual display device, and central processing unit with random access and read-only memory. Commercial personal computers, dedicated text processors (memory typewriters and related equipment previously known as word processing equipment), intelligent work stations used for translation processing on a multi-user computer, intelligent typewriters and portable computers are all examples of small computers. Some multi-use computers are also classed as small computers.

b. Standard small computer refers to computer resources acquired from an Air Force-wide requirements contract.

Software. Two types of software operate on small computers.

a. Operating system software operates the computer hardware's basic system functions such as: providing basic input and output routines, file maintenance procedures, and systems controls.

b. Applications software accomplishes the user requirements. It can be general-purpose, commercial, vendor-supplied software (programs) for word processing, data base management, and spread sheets, or it can be programs specifically developed by users for unique problems.

The following description of the Implementation of Processing Management System (IPMS) is provided as used in Chapter VI:

Information Processing Management System (IPMS). A proposed automated system for the Sperry 1100 to "manage the information processing hardware, software, facilities, personnel, and budget information for all Standard Information Systems..." The major functional objective of IPMS "is to provide a comprehensive centralized data base and software system to effectively track the ordering of all hardware and software, the installation of that hardware and software, the payment for that hardware and software to the respective vendors, the training of the information processing personnel to utilize the hardware and software, the facilities to house the hardware, and the budget information to support all facets of the information processing mission." IPMS is being prototyped in the Standard Systems Center (SSC). This system would provide users (base, division, SSC, Hq AFCC, and Hq USAF/SC on-line access via the Defense Data Network to a centralized data base located at the SSC. (Computer System Requirements Document, #86-0030 (SI), Information Processing Management System 1100/60 Computer Support, Staff Summary Sheet, Hq SSC/PRAII, 29 April 1987, Gunter AFS, AL).

The following terms are taken from AFR 57-1, Operational Needs, dated 28 May 1985 (Attachment 2) and are presented for reference:

Air Force Designated Acquisition Program (AFDAP). A program that is less than a major program and Milestone I, II, and III decisions are made by the Secretary of the Air Force (SAF), with the advice of the Air Force Systems Acquisition Review Council. AFDAPs will usually have estimated costs (Fiscal Year 80 dollars) for research, development, test, and evaluation (RDT&E) between $100 and $200 million or between $500 million and $1 billion for procurement (production). (Source: AFR 800-2.)

Implementing Command. The command or agency that a Program Management Director (PMD) designates responsible for the program objectives or program phase objectives the PMD establishes. (Reference: AFR 800-2.)

Integrated Logistics Support (ILS). A disciplined, unified, and iterative approach to the management and technical activities necessary to:

a. Integrate support considerations into system and equipment design.

b. Develop support requirements that are related consistently to readiness objectives, to design, and to each other.

c. Acquire the required support.

d. Provide the required support during the operational phase at minimum cost. (Source: DOD Directive 5000.30.).

Justification for Major System New Start (JMSMS). The JMSMS is used to document major deficiencies (or opportunities for improvements) in operational capabilities when it is planned to correct such deficiencies (or to capitalize on such opportunities) by the acquisition of a major new system or a major modification to an existing system. A JMSMS must be submitted for Office of Secretary of Defense (OSD) review not later than, or as a part of a service's Program Objective Memorandum (POM) submission in which funds for the budget year of the POM are requested for a major system new start. (Reference: DOD Directive 5000.1 and DOD Instruction 5000.2.)

Major Modification. Any system modification having estimated cost exceeding $200 million (FY 80 dollars) in research, development, test and engineering (RDT&E) funds or $1 billion (FY 80 dollars) in procurement funds (or both). (Reference: DOD Directive 5000.1.)

Major System. Any system having estimated costs exceeding $200 million (FY dollars) in research, development, test, and engineering (RDT&E) funds or $1 billion (FY 80 dollars) in procurement funds (or both) or as directed by the Office of Secretary of Defense (OSD) Acquisition Executive, the Under Secretary of Defense, Research, and Engineering (USDR&E). The Acquisition Executive may designate systems having lower estimated costs as major systems for other reasons such as development risk, urgency of need, or significant Congressional interest). (Reference: DOD Directive 5000.1.)

Originating Command. The major command or Separate Operating Agency that originates a Statement of Operational Need (SON).

Participating Command. Program Management Directive (PMD) designated command or agency that provides support and takes

part in carrying out tasks the PMD and Program Management Plan assign. (Reference: AFR 800-2.)

The following terms from AFR 700-3, Information System Requirements Processing, dated 1 October 1987 are presented for reference:

Automation Equipment (AE). General and special purpose automatic data processing equipment (ADPE), office automation equipment, including word processors, and other communications-computer processing devices.

Communications-Computer Systems Requirements Board (CSRB). The board established under AFR 700-5 at base level, MAJCOM, HQ USAF, and if required, at intermediate level to validate requirements and approve technical solutions for communications-computer systems requirements.

Communications-Computer Systems Requirements Document (CSRD). The document which identifies, describes, and justifies the need for communications-computer systems facilities, equipment, or services. It also identifies the initial technical solution, associated resources, and costs for fulfilling the need. The CSRD replaces previous requirements documents, such as Information System Requirements Document, AF Form 1070, Local Communication Service Request: AF Form 1225, BCTDS Statement of Requirement: Data Automation Requirement (DAR): mini-DAR; Programmed Automation Requirement (PAR); and Projected Communications Requirement (PCR).

Communications-Computer Systems Officer (CSO). At base level, the commander of the communications-computer systems unit responsible for carrying out the communications-computer systems staff officer responsibilities. At MAJCOM level, the person designated by the MAJCOM commander who is responsible for overall management of those communications-computer systems budgeted and funded by the MAJCOM.

Implementing Command. The command responsible for exercising overall management of an approved program for engineering, installing, and testing the facilities or equipment necessary to fulfill a requirement.

MAJCOM Functional Counterpart. The organization of higher headquarters to which the activity that will be using the required capability or service functionally reports. For example, the base security police unit counterpart is the MAJCOM SP.

Program Management Directive (PMD). The official HQ USAF management directive used to provide direction to the implementing and participating commands and satisfy the documentation requirements. It will be used during the entire acquisition cycle to state requirements and request studies, as well as to initiate, approve, change, transition, modify, or terminate programs. The content of the PMD, including required HQ USAF review and approval actions, is tailored to the needs of individual programs (AFR 11-1).

Standard Communications-Computer Systems Manager (SCSM). A person or organization within the Air Force to whom HQ USAF/SC has assigned responsibilities and delegated authority to carry out certain duties of HQ USAF/SC. The SCSM was formerly called the C-E single manager in the C-E field and Standard Automatic Data Processing System Manager under ADPE.

The following AFR 700-4, Information System Program Management and Acquisition (15 March 1985) terms are presented for reference:

Automated Information System (AIS). A collection of functional user and information systems personnel, procedures, and equipment which is designed, built, operated, and maintained to collect, record, process, store, retrieve, and display information.

Automatic Data Processing Equipment (ADPE). General-purpose, commercially available automatic data processing equipment and the systems created by them.

Automated Data System (ADS). An assembly of procedures, processes, methods, routines, or techniques (including, but not limited to computer programs) united by regulated interaction to form an organized whole and specifically designed to make use of ADPE.

Information System Acquisition Program. A directed effort for the development and procurement of systems, subsystems, equipment, or software, as well as supporting equipment, systems, or projects, which is managed under the AFR 700-series regulations with the goal of providing a new or improved capability for a validated mission need.

Information Systems Directive (ISD). A document developed and approved by the implementing command that identifies key decisions, assigns responsibilities, and authorizes specific resources and actions to develop and implement an information system.

Information Systems Engineer. The individual responsible for conducting studies to determine the best way to satisfy a requirement and by selecting the best approach for integrating the design requirements into a total system configuration.

Information Systems Program Plan (ISPP). The central plan which controls the program management effort.

Information Systems Requirement Document (ISRD). The document which identifies and describes the need for information systems facilities, equipment, and services. It also identifies the initial technical solution, associated resources, and costs for fulfilling the need.

Logistics Assessment. An assessment conducted during program management to determine equipment and logistics support availability and to determine actions needed to ensure full logistics support at program completion.

Lowest Total Overall Cost (LTOC). The lowest total cost to the Government for a system over its full life cycle. It includes the cost of development, procurement, operation, support, and disposal.

Program. For the purpose of this regulation, program is defined as a formally documented plan to acquire new, additional, or expanded information systems resources or to remove specified resources in order to satisfy a requirement.

Program Action Officer (PAO). An individual assigned to a program in response to the ISPP to coordinate all program-related actions assigned to their activity and to give status information to the program manager.

Program Manager. The single individual in the implementing command with the full authority and responsibility for managing a program. There is only one program manager for a given program; however, a program manager may manage more than one program.

Program Management. Coordinated actions that result in the application of resources to fulfill a stated need and the organized effort to provide equipment and software to meet a stated requirement.

Program Management Directive (PMD). The official HQ USAF management directive used to provide direction to implementing, operating, supporting, and participating commands and to satisfy documentation requirements, request studies,

and initiate, approve, change, transition, modify, or terminate programs. The content of the PMD, including required HQ USAF review and approval actions, is tailored to the needs of each program.

Requiring Command. The MAJCOM that needs an information system, service, or capability to accomplish its mission.

The following AFR 800-2, Acquisition Program Management (16 September 1985) terms are presented for reference:

a. **Acquisition Program.** A directed effort funded either through procurement appropriations; through the security assistance program; or through the research, development, test and evaluation appropriation, with the goal of providing a new or improved capability for a validated need. An acquisition program may include either the development or procurement of systems, subsystems, equipment, munitions, or modifications to them, as well as supporting equipment, systems, projects, and studies. Excluded from this definition and from this regulation are the general purpose, commercially available automatic data processing assets defined in Air Force 700-series regulations.

b. **Air Force Designated Acquisition Program (AFDAP).** A program that does not meet the dollar thres-hold of a major program but Milestone I, II, and III decisions need to be made by the Secretary of the Air Force (SAF), with the advice of the Air Force Systems Acquisition Review Council. AFDAPs usually have estimated costs (Fiscal Year 1980 dollars) for research, development, and test and evaluation between $100 and $200 million, or $500 million and $1 billion for procurement (production).

Implementing Command. The command or agency designated by Headquarters, United States Air Force to manage an acquisition program.

Justification for Major System New Start (JMSMS). The document prepared by Headquarters, United States Air Force to support the initiation of a major acquisition program or Air Force Designated Acquisition Program and submitted with the Program Objective Memorandum (POM) in which funds for the budget year of the POM are requested.

Participating Command. A command or agency designated by Headquarters, United States Air Force to support and advise

the program manager (PM). The supporting command is also a participating command.

Program Management Directive (PMD). The official Headquarters, United States Air Force management directive used to provide direction to implementing and participating commands and to satisfy documentation requirements. It is used during the entire acquisition cycle to state requirements, request studies, and initiate, approve, change, transition, modify, or terminate programs. The content of the program management directive, including required Headquarters, United States Air Force review and approval actions, is tailored to the needs of each individual program.

Program Manager (PM). The single Air Force manager (system program director, program or project manager, or system or item manager) during any specific phase of the acquisition life cycle.

Supporting Command. The command assigned responsibility for providing logistics support; it assumes program management responsibility from the implementing command.

System Program Office (SPO). The organization comprised of technical and business management and administrative personnel assigned full-time to a system program director. The office may be augmented with additional personnel from participating organizations.

The following AFR 800-8, Integrated Logistics Support (ILS) Program (25 June 1986) terms are presented for reference:

Acquisition Program. An acquisition program is a directed effort funded either through procurement appropriations; through the security assistance program; or through the research, development, test and evaluation (RDT&E) appropriation, with the goal of providing a new or improved capability for a validated need. An acquisition program may include either the development or procurement of systems, subsystems, equipment, munitions, or modifications to them, as well as supporting equipment, systems, projects, and studies.

Deputy Program Manager for Logistics (DPML). The DPML is an experienced logistician assigned to a major program office to assist in executing ILS responsibilities throughout the acquisition program.

Integrated Logistics Support (ILS). ILS is a disciplined, unified, and iterative approach to the management and technical activities necessary to: (a) integrate support considerations into system and equipment design; (b) develop support requirements that are related consistently to readiness objectives, to design, and to each other; (c) acquire the required support; (d) provide the required support during the operational phase at a minimum cost.

Integrated Logistics Support (ILS) Elements. The ILS elements are the principal logistics elements that must be properly integrated to achieve economical and effective support of a system or equipment throughout its lifecycle. The elements of ILS are defined and discussed in attachment 3.

Integrated Logistics Support Manager (ILSM). The ILSM is an experienced logistician assigned to a program, not designated as a major program, to assist in executing ILS responsibility throughout the acquisition program.

Integrated Logistics Support Office (ILSO). An ILSO is the ILS office within a program office.

Integrated Logistics Support Plan (ILSP). The ILSP is an Air Force management plan developed and used to manage the ILS process. This includes the horizontal integration of the ILS elements (that is, with each other), as well as their vertical integration into the various aspects of program planning, engineering, designing, testing, evaluating, and during production and operation. It also includes the integration of support elements with the mission elements of a system throughout its lifecycle. The ILSP is Section 9, Logistics, of the program management plan (PMP) and, when approved, becomes directive on all participating agencies. Transition of the ILSP is accomplished at program management responsibility transfer (PMRT) to ensure effective logistics management and support of the system during post production as a part of the program management planning effort. This planning effort is continuously updated as the program evolves.

Integrated Support Plan (ISP). The ISP is an iterative document prepared and updated by a contractor for acceptance and approval of the acquiring activity. It describes the contractor's plan for managing the contractual ILS program, for complying with the specific contractual ILS requirements, and for planning any operational support functions assigned to the contractor.

Program Management Plan (PMP). The PMP is a document developed and issued by the program manager that shows the integrated time-phased tasks and resources required to complete the task specified in the program management directive (PMD). The PMP is tailored to the needs of each individual program. Section 9 (Logistics) of the PMP is developed and maintained in current status as the ILSP.

Program Manager (PM). The PM is the single Air Force manager designated by the implementing command to manage an acquisition program.

The following SSCR 700-1, Managing Communications-Computer Systems, Attachment 2, 18 December 1987 terms are presented for reference:

Application Software. (Functional) consists of those routines and programs designed by or for automatic data processing equipment users to accomplish specific, mission-oriented tasks, jobs, or functions using the automatic data processing equipment and basic software available. Application software may be either general purpose packages, such as demand-deposit accounting, payroll, machine tool control, etc., or specific application programs tailored to accomplish a single or limited number of users functions, such as base level personnel, depot maintenance, missile or satellite tracking, etc. Except for general purpose packages which are acquired directly from software vendors or from the original equipment manufacturers, this type of software is normally developed by the user, either with in-house resources of through contract services.

Approval. Approval indicates that the requirement has been validated and the approving agency has the authority to commit resources needed to acquire/produce the desired product. Approval also indicates that the requirement is technically and economically feasible and that resources are available and will be committed to the program.

Automated Data System (ADS).

a. An assembly of procedures, processes, methods, routines, or techniques (including, but not limited to, computer programs) united by regulated interaction to form an organized whole and specifically designed to make use of Automatic Data Processing Equipment (ADPE).

b. Subdivision/identification of an SCS due to the degree of management during PPBS activities.

Automated Data Systems Maintenance. Efforts associated with the elimination of faults in software to ensure than an ADS is in satisfactory working condition. Fixing faults is limited to DIREPs, other similar trouble reports, and internally discovered program and documentation errors in operational systems.

Automated Data System (ADS) Manager. An individual who is responsible for internal planning, organizing, coordinating, controlling, and directing modification and maintenance of a software system (basic or application).

Basic Software. (Non-function) comprises those routines and programs designed to extend or facilitate the use of particular automatic data processing equipment, the requirement for which takes into account the design characteristics of such equipment. This software is usually provided by the original equipment manufacturer and is normally essential to, and a part of, the system configuration furnished by the manufacturer. Examples of basic software are executive and operating programs; diagnostic programs; compilers; assemblers; utility routines, such as sort-merge and input-output conversion routines; file management programs; and data management programs. Data management programs are commonly linked to, and/or under the control of, the executive or operating programs.

Command Unique Communications-Computer Systems. A communications-computer system which supports a function performed at one MAJCOM.

Communications-Computer System. A combination of equipment, procedures, and other resources used to process information. Processing proceeds from creation of infor-mation by the system user to serial or concurrent phases of protection, analyses, storage, retrieval, and dissemination to intended recipient for disposition.

Dedicated System Manager. The dedicated system manager is the person responsible for managing systems which are considered to be subsets of a Standard Communication-Computer System in the context used by HQ USAF (SCS-59, 10, 80, 49, etc.) and usually consist of dedicated hardware in support of one functional area or one ADS. The responsibilities of the dedicated system manager are a subset of those of the system manager.

Management Documents. Management documents are those which provide overall program definition, visibility, and decision making capability. Examples of these documents are the CSRD, SDN, CSD, CSPP, MENS, SON, cost/economic analysis,

feasibility study, Preliminary Technical Survey Report (PTSR), and Energy Requirements Plan (ERP).

Program Manager. An individual with authority and responsibility for the acquisition and/or development of new requirements for major communications-computer systems. Program management requires special management skills and supporting management structures to ensure the effective and efficient completion of tasks and responsibilities as defined in the program's associated management documents.

Requirements Manager. The individual or activity that serves as the focal point for all SSC communications-computer systems tasks received from both internal and external sources that require acquisition/production work and monitoring through the IRR. This function is assigned to HQ SSC/PR.

Requirements Processing. The process of documenting, analyzing, and approving requirements so that resources can be obtained and allocated to acquire/produce the solution that will best satisfy the requirement in minimum time.

Standard Communications-Computer System (SCS). A communications-computer system which affects more than one major command and requires centralized oversite in planning, design, development, acquisition, installation, operation, or maintenance.

Standard Communication-Computer Systems Manager (SCSC). A person or organization within the Air Force to whom HQ USAF/SC has assigned responsibilities and delegated the authority to manage standard communications-computer systems. The SCSC was formerly called the Communications-Electronic (C-E) Single Manager in the C-E field and standard Automatic Data Processing Systems (ADPS) manager under ADP, SSC/CC is the SCSM for all standard communications-computer systems assigned to the SSC.

Standard Systems Center Unique. A communications-computer system that supports a function at SSC.

System. A composite of equipment, skills, and techniques capable of performing and/or supporting an operational role. A complete system includes related facilities, equipment, materiel, services, and personnel required for its operation to the degree that it can be considered a self-sufficient unit in its intended operational and/or support environment.

System Manager. The system manager is responsible for controlling all technical aspects, both hardware and

software, for communications-computer systems assigned to SSC from PMRT until system cancellation.

Validation. Validation indicates that the stated need or requested service is a true need. Validation does not necessarily lead to the expenditure of resources. To be valid, requirements must provide needed improvement in mission capability, comply with Air Force doctrine, implement Air Force plans, and meet the guidelines set down in communications-computer systems directives such as the Air Force 700- series regulations. Validation by the CSRB should lead to the expenditure of funds or commitment of other resources if the requirement is later funded through the Programming, Planning and Budgeting System process. Validated requirements must be approved before resources may be expended on the requirement.